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Main-line Electrification

WHEN the financial crisis came upon us last autumn it was quite freely said in electrical circles that the chances of main-line-railway electrification had been spoiled for a very long time ahead. It was feared that the large capital expenditure involved in the complete scheme outlined in the Weir Committee's Report would provide a good and sufficient excuse for the inertia in face of difficulties of which the railway companies are so often accused.

Recent pronouncements by leading electrical engineers, who realise that economy means much more than mere abstinence from spending, are more cheerful; they show that the case for main-line electrification is not to be allowed to go by default.

It was, of course, never proposed that the change-over to electrical working should be made all at once—fifteen years was the period mentioned—and there seems to us to be no sound reason why Captain Donaldson's plea for the electrificaiton of an experimental length of 200 miles should not be put in hand forthwith. It would be a first instalment, but if the result did not justify extension, the work could stop there.

Mr. J. M. Kennedy, a vice-president of the I.E.E., supported the views of his president last Saturday, by pointing out that in the areas of denser traffic the return on capital would greatly exceed that anticipated from the entire scheme, and on Wednesday, at Birmingham, Sir Philip Dawson (who reviewed the Weir Committee's Report for us last May) restated the case, and introduced some new arguments in favour of early action.

It is interesting to note, incidentally, that the total capital expenditure per kWh sent out from the power station is approximately the same for a large electricity supply undertaking as for an electrified railway, so that the magnitude of the expenditure spread over a long period of years need not deter us; it is the return that will count.

It is here that the Diesel-electric locomotive will prove a useful ally. Where there appears to be no likelihood of a satisfactory return on the cost of transmission lines, converting plant, and track equipment, there should be ample scope for the portable power-station type of locomotive.

Such an arrangement, provided it is not carried far enough to cause "dual working" or to prevent the fullest and most economical employment of the main scheme, should provide the most practicable arrangement, and one that could be most easily adapted to meet doubtful conditions as they arise.

Whatever we may technically desire, however, recent events have shown that there is not a great readiness on the part of the public just now to find capital for operations coming even within our category. The fall in the bank rate is now leading to the absorption of the millions of stock offered by the Central Electricity Board, and the Galloway issue is being taken up. The question really is whether the public would regard a many millions issue for railway electrification more enthusiastically than it did these other loans.

The Prince and Mr. Siddeley

ON Friday last Mr. H. C. Siddeley was received by His Royal Highness the Prince of Wales, before whom he was able to place further particulars regarding the important appointment that he proceeds next month to take up in the Argentine on behalf of the British electrical industry. The nature of this joint effort of Government and private enterprise is already well known to our readers. It will be remembered that Mr. Victor Watlington, chairman of the B.E.A.M.A., was received by the Prince between two and three weeks ago in connection with the same matter. ("An Electrical Ambassador," ELECTRICAL REVIEW, February 12th.) The Prince's deep interest in this effort cannot fail to encourage both Mr. Siddeley personally and the British manufacturers whose interests he is determined to serve.

Infinite Variety

PROBABLY never before has one been able to see so many types of hot-plates in one exhibition as are this year on show at the Birmingham Section of the British Industries Fair. The supply engineer, &c., has the opportunity to see and compare induced-current, thermal-storage, open, semi-protected, and closed plates in various styles. Be it far from us to suggest that it should be otherwise at present—the ideal boiling-plate has yet to be found—but a word of warning is necessary. Every effort should be made to avoid creating an impression that electric cooking is not economically sound—it is—and responsibility in this connection rests largely with the manufacturers. The complete domestic cooking outfit, with open or closed plates, and including an electric kettle, can and does give entire satisfaction to supplier and consumer on a competitive basis when suitable service and maintenance arrangements are provided.

Reyrolle —Eureka

THE name Reyrolle has stood out very prominently for many years in the switchgear department of the British electrical industry. It has also found a good place for itself in American industry. But original and enterprising as the company has been in that particular class of manufactures, it has not by any means limited itself thereto. It broadened its activities when it brought within its sphere of operations the well-known motor business of J. H. Holmes, and the manufacture of insulation materials. What it is now doing, according to information circulated this week, is to extend its efforts, which are already opening out, in the domestic electrical section. It is quite a legitimate step from immersion water heaters and cooker control boards to the manufacture in this country of Eureka vacuum cleaners. This is being done under the arrangement made with the Eureka Vacuum Cleaner Co., Ltd., who, under the altered trade conditions, will sever all connection with the American company and have their goods produced by Reyrolle's, the Eureka Company themselves continuing the work of distribution.

New Products in Existing Works

PRESENT industrial developments are affording opportunities to electrical manufacturers to vary or expand their classes of products. Some foreigners who are coming to this country to produce goods are finding it convenient to have their work done in the factories of existing companies where there happens to be room at the moment, rather than to erect special works of their own. And it may be good policy for manufacturers who have been so busy for years past on the national grid scheme to take other lines under their wing, spreading out the chances after the manner of the discreet geographical investor.

Dundee's Cables

FOR a long period it was our melancholy duty to record from time to time the decision of the Dundee Corporation to accept tenders for foreign cables because they were lower than the British offers. Now, we are glad to see, there has been a change of heart and recently the Council has favoured the purchase of British cables although they still cost more. We think the decision is wise for more reasons than the principal one which is to provide employment for British workers. British cables cannot be beaten for reliability and long service and their slightly greater cost is in the nature of an insurance against breakdowns.

A Silvertown Scheme

WHILE on the subject of cables, we may fittingly draw attention to a very useful scheme which has been introduced by the Silvertown Company. This system involves the incorporation of a "length mark" in the manufacture of cables and wires at intervals of five yards. This renders the cable "self-measuring" and should save a great deal of time and trouble in paying out. It enables supplies to be taken off the drum or coil without the need for measuring, and lengths can be coiled up at the same time, thus guarding against kinks and tangles. The system also enables users to see at a glance exactly how much remains on the drum or coil. This is another example of the idea which should have occurred to somebody a long time ago.

Electricity Supply Equipment

WE made brief allusion last week to the progress that has been made by the North-Met. Co. Certain other matters concerning this go-ahead company were mentioned in Lord Ashfield's speech on Tuesday, which lead us to return to the subject. The inclination to regard the electrical industry as in a bad way because most of the exceptionally big orders for the national scheme have been executed would be changed, we think, if our pessimists would remember that we have 500 electricity works, that there are such things as obsolescence, depreciation and replacements, and that—using Lord Ashfield's words—"It is impossible for a company to expand its activities and improve its undertaking without a considerable expenditure of capital." The extension and technical improvement of the distribution system of the North Met. cost the greater part of £485,097. We cannot help feeling that there is a great deal of electricity supply replacement and improvement work proceeding without any great fuss being made about it. And there are greater times in store.

Follow This Lead!

THE closing part of Lord Ashfield's speech is to us most exhilarating. We refer to his statement of the general policy of the company. It is the right policy for these or any other days in connection with electricity supply. We believe it would even remove the "uneasiness" of the Central Electricity Board if every other undertaking could repeat the same words as descriptive of its creed: "We recognise," said Lord Ashfield, "the necessity for providing the best possible service at the lowest possible cost to the residents in the areas in which we supply electricity. . . . We aim at securing every resident on our route of mains as an electricity user, and we exercise every endeavour to encourage the use of electricity for every possible requirement in the home—lighting, of course, but, in addition, cooking, water heating, cleaning, washing and heating generally." "Go thou and do likewise!"

Fish-fryers

Is there not room for improvement in the design of fish-fryers? Oil, being a semi-viscous fluid, is not quickly heated by convection. Concentration of the elements at the bottom of the heating vessel would appear to be a less suitable arrangement than dispersing them about the structure, which would allow for the application of heat to all points.

Checking Progress

AN article in this issue, "An Electrical Engineer's House," draws attention to the increasingly urgent question of the handicap on electrical development that may be imposed by a supply authority which is unable to fulfil all its obligations to its consumers—as these are now understood. The author, a corporate member of the Institution of Electrical Engineers, started with a natural bias in favour of water heating by electricity, but the obstacles were too much for him. How much more easily would the ordinary consumer have been discouraged by the inability of the local supply undertaking to cope with his needs. Supply engineers who have gone all out after the water-heating load assure us that the employment of a specialist in this branch is essential.

Frequency Change-overs.

By R. H. Rawll, A.M.I.E.E., A.M.I.Mech.E.

Some practical points to be observed during the transition period

THE standardisation of frequency at 50 cycles per second has necessitated not only alterations to generating plant in certain areas, but also the much more complicated task of changing over distribution systems and consumers' plant in such areas, which represents the greatest part of the capital expenditure involved.

Although these frequency change-overs are financed by the Central Electricity Board, the supply undertaking concerned is responsible for their execution. This is common-sense procedure, as the change-over of a highly developed and complicated e.h.p. supply system could be carried out successfully only by those engineers who are intimately concerned with its everyday operation.

[*Elliott & Fry*

Mr. R. H. Rawll is chief assistant to the frequency change engineer of the Birmingham Corporation Electric Supply Dept.

Little is heard or seen of these frequency change-overs which are being carried out by many undertakings in different parts of the country but which are not so much in the public eye as the construction of the grid. Yet, in my opinion, they demand a far greater degree of technical skill and adaptability than that required for straightforward constructional work.

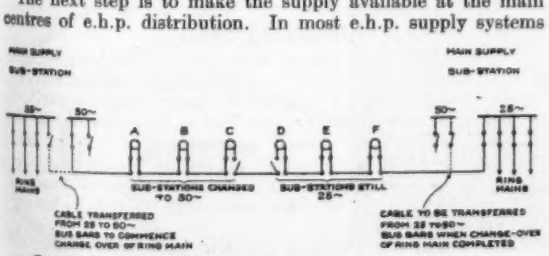
The methods to be adopted and the difficulties to be overcome will vary both according to the numerical value of the non-standard frequency to be changed and to local conditions. The two chief non-standard frequencies are 40 and 25 cycles. In both cases several large and important supply undertakings, with e.h.p. distribution systems of an extensive and highly complicated nature, are concerned. The problems involved in changing from 40 to 50 cycles are, of course, different from those presented in changing from 25 to 50 cycles. For instance, the speeds of the replacement 50-cycle motors for the majority of industrial drives would be different from those of the displaced 40-cycle machines, whereas, in a change-over from 25 cycles, as the standard frequency is exactly double the existing frequency, no difficulty is experienced in obtaining 50-cycle motors running at the same speed as the present machines.

Distribution Sub-stations

The main principle of the method adopted in carrying out the change-over of an e.h.p. supply system is to make available at a number of centres (usually existing main distribution supply sub-stations) a supply of 50-cycle current and then to transfer to it one end of an e.h.p. ring main, the remote end of the ring remaining to feed at the non-standard frequency. The various loads, consumers' sub-stations, &c., on the ring are then in turn changed over to 50 cycles, until the whole ring operates at that frequency.

The first thing to be considered is the source of the 50-cycle supply. If the supply undertaking is connected to the grid it is unnecessary to install new 50-cycle generating plant. In some instances, however, the grid supply has not been available and additional 50-cycle generating plant has had to be installed in the selected station or stations of the supply undertaking concerned before beginning the change-over.

The next step is to make the supply available at the main centres of e.h.p. distribution. In most e.h.p. supply systems



Procedure with sub-stations connected to a ring main

trunk mains radiate from the generating station to the main distribution sub-stations. It might, therefore, at first sight be considered a comparatively easy matter to solve this problem by releasing some of these existing trunks for change-over to 50 cycles but in many instances it will be found that this involves serious risks to continuity of supply, both as regards the existing non-standard and the 50-cycle supplies.

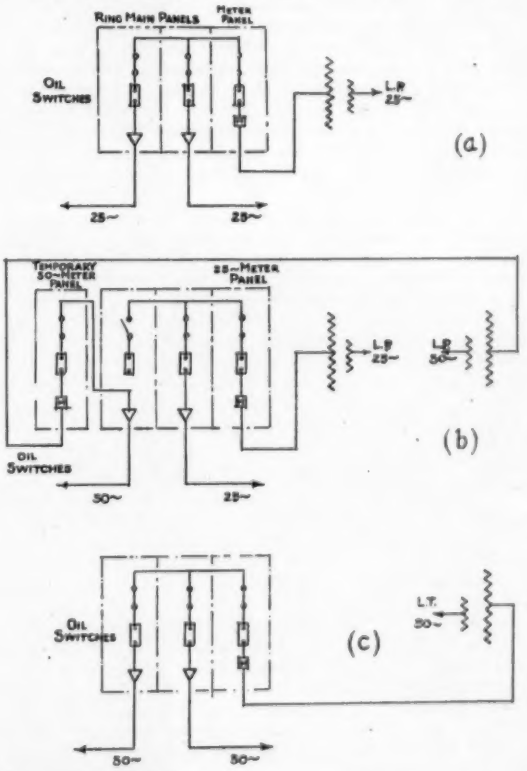
Although a certain amount of unavoidable risk must often be taken, it would obviously be out of the question to commence the frequency change of a whole area dependent on one 50-cycle trunk cable only.

New Cables Required

A sufficient number of stand-by trunks must also be available for supplying current at the non-standard frequency. This usually entails the laying of new 50-cycle trunk mains, but their number can be reduced to a minimum if a careful programme is mapped out. It is important to remember that, in the early stages of the change-over, the 50-cycle supplies are the more vulnerable and it is therefore advisable to arrange as many stand-by feeds at 50 cycles as can be economically afforded without seriously reducing the stand-by security of the existing non-standard system.

A number of 50-cycle e.h.p. panels are erected and made alive in the sub-stations for controlling either new 50-cycle outgoing cables or existing ring mains that have been changed over. The switches thus released are subsequently connected to the 50-cycle supply and other ring mains are transferred to them.

It is usually necessary to lay new lengths of e.h.p. cable between some points of the network in order to reduce overloading of ring mains which are being changed over. In normal circumstances, the total load on a ring main is approximately shared equally by each source of supply, the ring being



(*a*) Arrangement prior to change-over.
(*b*) 50-cycle transformer connected to temporary meter panel to provide supplies at both frequencies.
(*c*) Change-over completed. 50-cycle transformer connected to permanent meter panel now equipped for 50 cycles.

Change-over of e.h.p. equipment in consumer's sub-station

broken by leaving open a convenient ring-main switch at a consumer's sub-station; but when one end is connected to the 50-cycle supply in order to commence the change-over the ring is closed at the cutting point and the whole load on the ring at the original frequency is then taken from the other feeding point. As the consumers are changed over in succession along the ring, the load on the non-standard frequency diminishes, until the positions are reversed and the whole of the load is taken by the 50-cycle feeding end.

A considerable amount of plant, such as e.h.p. trunks, ring mains, switchgear, transformers, and also possibly generating plant has thus to be put into service before the work of changing over the consumers' plant can be started.

D

In changing over the e.h.p. gear of a consumer's sub-station, the metering equipment and no-volt coils are usually the sole items requiring replacement, as the original transformers, in the majority of cases, are suitable for running on 50 cycles. Transformers feeding rotary convertors and mercury-arc rectifiers, however, require, in most cases, rewinding or exchanging, on account of the effect of increased reactance.

Where the consumer can dispense with the supply for a period (such as at a week-end or other holiday time) sufficiently long to effect the complete change-over of his l.p. plant, the work on the sub-station equipment can be carried out concurrently by simply opening the meter-panel switch and its isolators.

The ring-main switch and its isolators controlling the existing supply at non-standard frequency having been opened, the 50-cycle supply is then switched on to the ring-main busbars through the other ring-main panel. In many instances, owing to the amount of plant to be changed over, it is necessary to maintain both non-standard frequency and 50-cycle supplies at a consumer's premises for a while.

Temporary Transformers

At convenient times the original motors, &c., are replaced by 50-cycle equipment and transferred to the 50-cycle supply, until the whole installation has been changed over.

This obviously involves installing temporarily one or more 50-cycle transformers in the sub-station in addition to the existing transformers. The method adopted to effect this depends, amongst other things, upon the circumstances prevailing in the sub-station under consideration, and it can be safely said that no two jobs are alike.

The successive stages of the procedure are clearly indicated in the accompanying figure. For the sake of simplicity, the case here considered is one in which the whole of the consumer's load is normally supplied through one transformer.

The bulk of the work involved in changing over a consumer's plant is the replacing of the existing motors by 50-cycle machines. Where the whole plant can be shut down during the change-over the work entailed is usually mainly millwrighting in character, that is to say, the substituting, lining up, &c., of the 50-cycle motors. The electrical work in such cases is limited to disconnecting and reconnecting the wiring at the motor terminals and carrying out the necessary alterations required to the starting gear, such as substituting 50-cycle no-volt coils, &c.

On the other hand, if the consumer cannot conveniently shut down his works for a period long enough for all the plant to be replaced, then it is necessary to provide both non-standard frequency and 50-cycle supplies for a limited period and to transfer the load gradually from the former to the latter at convenient times. The change-over under such conditions becomes more of an electrical problem than one of millwrighting and usually means the installation of a considerable amount of temporary wiring. In large works great care has to be exercised to keep the non-standard frequency and 50-cycle supplies separate, especially with regard to the sub-circuit wiring.

The Importance of Labelling

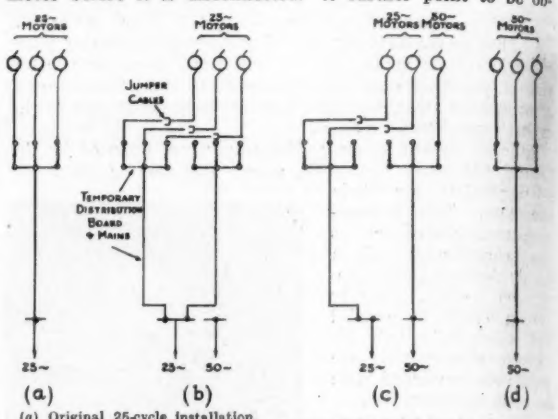
The staff carrying out the change-over must label all distribution boards, cables, sub-circuits, &c., whether temporary or permanent, stating the frequency of the current carried and also giving correct particulars of the plant fed by them. Such labelling, of course, must be altered as the change-over progresses.

The whole of the lighting installation should be transferred to the 50-cycle supply as soon as possible, in order that any night work that may be necessary may be facilitated. It is also essential that motors driving any machine tools which might be required in connection with the fitting of pulleys, couplings, &c., should be changed over either first or last, in order that they may be available during the whole of the change-over period.

Many works are so laid out that each section of the premises is fed from a separate cable controlled from a main switchboard. With such an arrangement, the whole of the plant in any section can be changed over in a single night or during a week-end and, apart from the changing of the motors, this only entails transferring the cable feeding it to the temporary 50-cycle supply at the switchboard end.

Nevertheless in a large works it is often impossible in the time available to effect the change-over simultaneously of all the motors fed even from a sub-distribution board. One method of overcoming this difficulty is illustrated below. The advantage of this method is that the new 50-cycle motors are running from the outset on the original permanent wiring and the temporary wiring—always a potential source of danger—cannot be left in position in the anxiety to get the 50-cycle motors working, as would be the case if they were connected to a temporarily installed 50-cycle board as they were changed over.

An important point, which, if forgotten, causes considerable extra work and annoyance after the motor has been changed, is to mark the correct direction of rotation of each motor before it is disconnected. A further point to be observed is that earth wires and bonds must be replaced in an efficient manner.



(a) Original 25-cycle installation.
(b) 25-cycle circuits transferred to temporary distribution board.
(c) Circuits feeding 50-cycle motors reconnected to permanent distribution board.
(d) Change-over completed.

Individual changing of motors fed from a common distribution board

Starting Torque and Current

The starting torque of a 50-cycle squirrel-cage induction motor is usually less than that of the non-standard frequency motor which it is replacing. It is, therefore, essential that the starting conditions of the existing motors should be thoroughly investigated and, if necessary, torque tests taken. (Such tests should be taken under the worst conditions of starting, *i.e.*, on Monday mornings).

The installation of high-torque 50-cycle motors may sometimes be found necessary. Where star-delta starters are used difficult starting can often be overcome by direct switching on to the line, if the starting current thus occasioned is permissible, or, alternatively, by the employment of an auto-transformer starter.

Where slip-ring induction motors are replaced it may be necessary to alter or replace the starter resistances to suit the rotor current of the new 50-cycle machine, although the 50-cycle rotor is designed wherever possible to suit the existing starter. If the rotor currents are heavier than those of the displaced motor, due regard should be taken of the size of the wiring between the slip ring and starter, since, if brush-lifting and short-circuiting of the slip rings is not utilised, this may be too small. In some types of starter the overload protection is in the rotor circuit; should the rotor currents be heavier, the overload coils may require changing.

With regard to control gear, potential coils, such as no-volt, magnetic-brake and contactor coils, will usually require changing, although with respect to no-volt coils in some types of starters and switchgear it is possible to make the tripping mechanism function satisfactorily by merely altering the tension on the control spring when this is fitted.

Arrangements can be made with the manufacturers of the 50-cycle plant to paint the inventory number of each machine on both the equipment itself and also on its packing case before delivery. On arrival on site, reference is made to the official survey of the existing plant, where against the inventory number will be found full details regarding the position and location of the machine to be replaced. The checking over of 50-cycle plant prior to commencing a change-over is perhaps the most important link in the chain, for on this the success of the operation very largely depends.

Generating Plant

The following requirements must be met in changing over existing generating plant in the undertaking's selected station: (1) an increasing supply of 50-cycle current must be available to keep pace with the increasing load at 50 cycles due to the change over, and the normal development of load in areas changed over; (2) a decreasing supply of non-standard frequency supply, bearing in mind the normal development of load in areas not yet changed over; and (3) surplus current for export to the grid.

The existing non-standard sets will have to be taken out of commission for rewinding at such intervals as will fulfil requirements (1) and (2). Curves constructed to show the loads at the estimated rate of progress of the change-over should be frequently compared with the actual loads at both frequencies at any particular dates, in order that a revision of the rewinding programme may be made if necessary.

The Lighting of the Little Theatre, Bournemouth (*See page 326*)

Train Lighting in India. By H. C. Harris, A.M.I.E.E.

The arrangements adopted for ensuring constant voltage

IN the parallel block system of train lighting which is standardised on all the important railways in India the generators, batteries, and boards holding the automatic switches, &c., are attached to the underframes of the coaches, the generators being belt driven from pulleys on the coach axles. Two 24-V batteries are connected to each generator, one regulating the voltage supplied to the lamps, fans, &c., while the other is on charge. A magnetic change-over switch reverses the positions of the batteries every time the train starts, thus ensuring that each battery is kept in approximately the same condition of charge. In the early types of Stone's dynamos, a see-saw lever fitted on the dynamo fulfilled the same purpose.

The main cables are run along the roofs of the coaches, and joined by flexible multicore couplings; they are in effect bus-bars to which the dynamos and batteries are connected in parallel. Every coach is not necessarily provided with a generator and batteries, and trains are frequently divided up and remarshalled in different combinations, possibly several times on one journey. Mather & Platt's and J. Stone & Co.'s dynamos are used, and work quite satisfactorily in parallel with one another.

The dynamos are designed to give constant output over an exceedingly wide range of speed, and to have constant polarity irrespective of the direction of rotation. These characteristics are obtained mechanically with Stone's system, and electrically with Mather & Platt's system.

In Stone's system the dynamo is suspended by an adjustable link, in such a manner that it is free to swing towards or away from the driving pulley on the axle. After putting on the belt, the link is adjusted so that the former draws the dynamo out of the position in which it would naturally hang, thus putting sufficient tension on the belt to transmit the maximum power required. The pull on the belt increases in proportion to the speed of the train, until it is sufficient to draw the dynamo towards the driving pulley, thus slackening it and allowing it to slip; this prevents the dynamo from exceeding a certain speed, and limits its output.

The tension on the belt is regulated to give an output sufficient to keep the batteries charged, and depends upon the connected load. Thus a dining car installed with an electric stove and refrigerator would obviously require a larger dynamo regulated to give a greater output and batteries of a greater capacity.

The latest type of machine (Lilliput) maintains constant polarity by means of a contact-changing device actuated by brush friction, the contacts being held firm magnetically while the dynamo is running. In the earlier types, many of which are still in use, the contact-changing device is actuated by lignum vitæ friction blocks, which rotate with the shaft and draw a rocking arm round into its appropriate position. This rocking arm is then pushed along the shaft by a centrifugal governor, to close contacts when sufficient speed has been attained to prevent the batteries discharging through the dynamo.

The Mather & Platt system makes use of the "Rosenberg" constant-current generator. This is similar to an ordinary generator, except that the brushes "aa" which are normally the main brushes are short circuited, and the output is taken from a second pair of brushes "bb" at right angles to these. The current passing through the short-circuited brushes produces a flux at right angles to that produced by the field windings, completing its magnetic circuit through the pole tips.

This flux serves to generate the voltage between the brushes "bb." The yoke and pole cores are made of small cross section to prevent the flux becoming too large, and the short-circuit current is thus limited. The pole pieces, however, are made much larger than usual, as they have to carry sufficient flux to produce the main e.m.f. The current taken from the brushes "bb," when circulating in the armature, exerts a magnetising force in opposition to that produced by the field winding, which increases as more current is taken from these brushes, thus reducing the resultant flux between the poles.

FIG. 1.

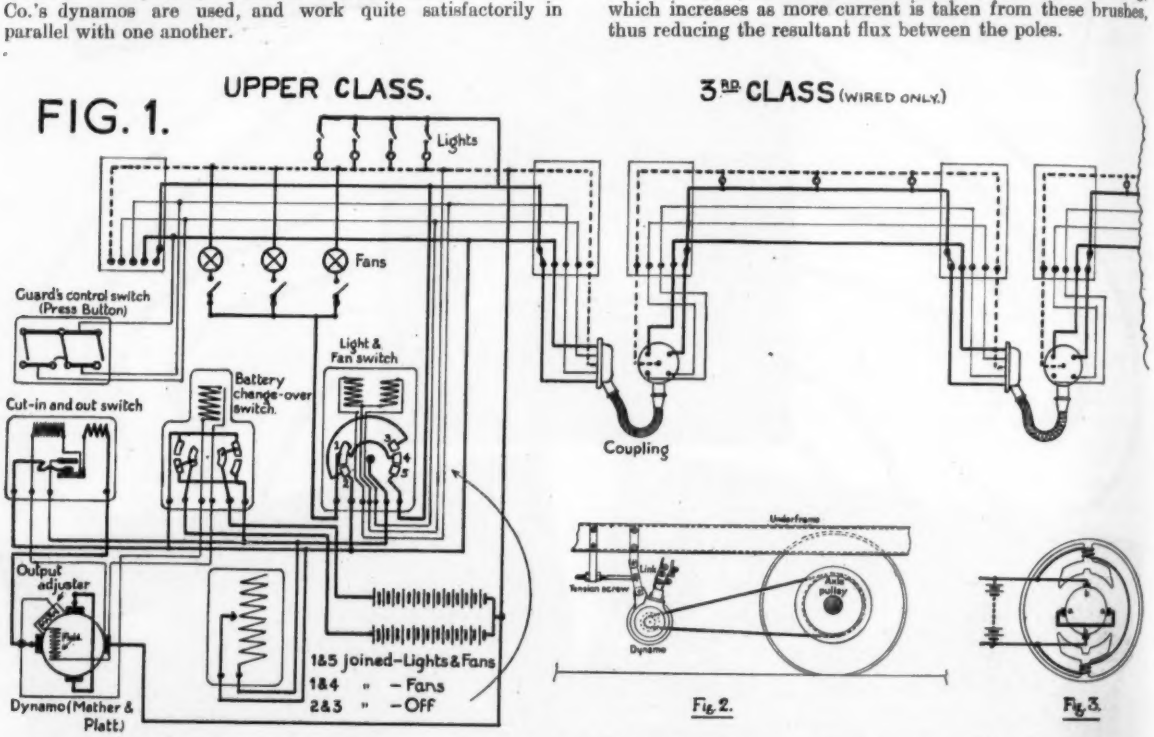


Fig. 2.

Fig. 3.

Fig. 1.—Connections of parallel block system. Fig. 2.—The Stone lighting system. Fig. 3.—Mather & Platt's c.c. generator.

This reduces the short-circuit current, and hence limits the output, which is adjusted to the correct amount by a variable resistance in series with the field. No change of connections is required when the direction of rotation is reversed, because this reverses the direction of the current between the short-circuited brushes, and therefore the direction of the cross flux. Since both flux and rotation are reversed the polarity remains the same.

A magnetic cut-out is used to prevent the batteries discharging through the generators; the only exception is the old type of Stone's dynamo, in which the rocking arm, referred to earlier, is pushed along the shaft by a centrifugal governor. A main switch for the lights and fans is fitted at the end of each dynamo-fitted coach.

Both lead and alkaline cells are in use. The latter type has a considerably longer life, will stand much more rough usage, is lighter and hence much easier to handle, and any leakage of electrolyte will not cause damage. It has, however, the disadvantage that its voltage depends upon its state of charge, and that it needs to be charged at its full rate in order to retain its capacity in service.

A large proportion of failures is due to theft, and ignorance of the running staff is another source of trouble. Trains are not infrequently marshalled solely made up of non-dynamo-fitted coaches, or gas-lit coaches are attached in the centre of the train isolating the non-dynamo-fitted coaches. The addition of acid to alkaline cells has occurred occasionally. Rough shunting is a frequent cause of damage to cells, in spite of most careful packing with rubber cushions between each cell.

Adapting D.C. Motors. By G. Waters, B.Sc.

RECONSTRUCTION or alteration of a factory often necessitates alterations to the shafting drives that will change the duties required of the electric motors. These may, however, be adapted in many cases to meet the new conditions.

Broadly speaking, the speed of a shunt-wound machine on a given supply voltage depends on the armature winding, and the figure given on the nameplate must be regarded as defining within narrow limits the speed at which it will run satisfactorily without rewinding the armature. It is generally possible, however, to raise the speed of a machine by inserting resistance in the field circuit. The maximum increase obtainable this way is only about 20 per cent., as modern machines are designed with a strong armature and a weak field, and further weakening of the field may lead to sparking at the commutator.

An armature may be rewound with a different number of turns per coil; this will change permanently the characteristics of the machine. As the speed varies directly with the number of armature turns, the number of turns per coil should be ascertained to discover whether a rewind would enable the old machine to meet the new conditions. If the machine had originally a three-turn armature winding, then reducing this to a two-turn winding would give a 50 per cent. speed increase; if the copper size were proportionately increased almost a 50 per cent. increase in output would be available, so long as the current density in the brushes did not exceed 50 or 60 A per sq. in. Similarly, if a four-turn winding were substituted the speed and output would be only 75 per cent. of their original values. If the exact speed required cannot be obtained by these means then a variable resistance in the shunt-field circuit will give the final adjustment.

Series motors may have their winding altered in the same way, but the light running speed of the machine must be watched, as this is increased when the full-load speed is raised.

Alteration of Supply Voltage

With shunt-wound machines the speed varies almost in direct proportion to the terminal voltage. With a reduction in voltage the speed will be reduced proportionately, and the current as given on the name plate will still be the maximum, as it is fixed for a given temperature rise; this current at the new voltage gives the new maximum output for the machine. In such a case it is usual to split the field coils into two or more parallel circuits, the original field strength being maintained by an adjustable resistance.

An increase of voltage will increase the speed proportionately. In this case the field strength must be maintained by a series resistance so as to avoid undue heating of the coils. The current at the new voltage will define the new maximum output.

When operating a machine on an increased voltage care should be taken that the p.d. between each commutator segment does not reach a dangerous value. If 20 to 25 V is not exceeded there should be no danger of a flash-over. Volts per segment = total number of segments × supply voltage/number of poles.

Eddy currents are proportional to the speed of the motor if the field remains constant. When the speed is reduced the iron losses and armature heating are reduced, but as the reduction in speed also lessens the ventilation of the armature due to its rotation the final effect (provided the armature I^2R losses remain constant), may be very small.

When the speed is increased the iron losses are increased in slightly more than direct proportion, but the increase in speed will materially improve the ventilation of the armature, so, provided the speed increase is not more than about 50 per cent., the final heating of the machine should not be greatly affected. If the speed increase is greater than this, then a reduction in the rated current must be made so that the total of I^2R and iron losses is not excessive.

The foregoing remarks apply equally to series machines, with the exception that their light-load speeds may perhaps become too high when the voltage is raised.

Change of Enclosure

Change of enclosure implies a change of rating, as when a continuously rated enclosed ventilated motor becomes a totally enclosed machine. All ventilation is then cut off except that due to radiation from the motor casing, and this has the effect of reducing the continuous rating to 35 to 40 per cent. of its enclosed ventilated rating. If, however, a short-time rated machine will suffice for the new conditions, then, on a one-hour rating, the totally enclosed machine will give the same output as the enclosed ventilated motor, and on a half-hour rating it will give 25 to 30 per cent. more output than the original e.v. machine.

It is usually possible to make an e.v. into a t.e. machine by reducing the output, but it is not so easy to make a t.e. short-time rated into a continuously rated motor, because the latter kind has the maximum iron losses. In a half-hour rated machine most of the iron losses go to raise the temperature of the core by about 90 deg. F. and even with the machine open the ordinary ventilation may not be sufficient to keep the core adequately cooled, and a fan must be fitted in one end cover.

On continuous e.v. duty a t.e. half-hour rated motor will give 65 to 70 per cent. of its original output, and a one-hour rated motor will give the same output.

Some Driving Forces in the Industry

Leaders of Standard Telephones & Cables, Ltd.

1, Mr. E. S. Byng, managing director; 2, Mr. F. Gill, chairman of the board; 3, Mr. F. J. E. Brake, technical director; 4, Mr. C. W. Eve, sales manager; 5, Mr. G. Hurford, director of manufacture; 6, Mr. H. J. Horink, chief engineer; 7, Mr. A. L. C. Chalk, secretary and comptroller [*Photographs by Elliott & Fry* (2, 5 *and* 7), *Lafayette* (1), *and R. Haine* (4)]

An Electrical Engineer's House. By "Olton"

Why the "all-electric" ideal has not yet been realised

THERE have appeared in the ELECTRICAL REVIEW from time to time a number of useful articles setting out in detail the costs of working an all-electric house. Although the latter is undoubtedly most desirable, the "nearly electric" or "one coal-fire house" is much more popular.

The writer had occasion to take a new house some eighteen months ago, and originally intended it to be all-electric, but for various reasons his ambitions have not been fully realised and he is now possessed of a "nearly all-electric" dwelling. The costs over a period of twelve months are tabulated below:

	Consumption.		Cost.	
	Year.	Week. (Average.)	Year.	Week. (Average.)
			£ s. d.	s. d.
Electricity, kWh.				
Light	213	4	—	—
Power	1,351	26	—	—
Total	1,564	30	7 17 9	3 0½
Gas, cub. ft.[1]	32,000	615	8 5 4	3 2
Coal[2]	1 ton	43 lb.	2 8 0	0 11
			£18 11 1	7 1½

[1] At 5s. 2d. per 1,000 cub. ft. [2] At 48s. per ton.

My house is a typical modern small detached villa, having dining room, sitting-room, kitchen and pantry on the ground floor, and three bedrooms and a bathroom above. The number of permanent occupants is two. Electricity is purchased at the rate of 0.75d. per kWh, with a fixed charge of £3, being 15 per cent. of the rateable value.

Two meters only are provided, one in the power and one in the lighting circuit, which are read weekly.

The house is situated on high ground in the South of England and overlooks downland. It is exposed to considerable wind, but the general climate is milder than that of the Midlands and North.

Lighting is, of course, electric, and 100-W lamps are used throughout, except in the bathroom, pantry, and hall. One lamp had to be replaced during the period under review; this had been in use 15 months when it failed.

Heating and Cooking

Heating is done by one coal fire (in the living room) and four electric fires. The coal fire is generally used in the afternoons and evenings during the late autumn and winter months—at other times it is replaced by a 2-kW "Davidson" portable fire. The efficiency of heating is considerably enhanced if the fire is raised by standing it on the hobs of the grate instead of at floor level.

The one coal fire was decided upon after much discussion with the lady of the house, who desired one "real" fire to be retained. Also it was difficult to estimate the probable cost of total electric heating without experience, and the coal fire was decided upon as a safety-first measure.

The sitting-room is heated by a 3-kW "Magicoal" fire. It is found that the room can be quickly warmed up with the full heat on, after which a comfortable temperature can usually be maintained with the use of 1 kW only. The other two fires—a 2-kW "Berry" portable and a 600-W bowl—are used as required in the kitchen and bedrooms.

A Word for the Boiling Ring

The "Magnet" cooker installed is hired from the electricity supply undertaking. As I was somewhat sceptical of the cost of boiling by the hot plates, I originally installed three gas rings, but owing to the difficulty of cleaning them and the unpleasant odour of the gas I installed an electric kettle and retained only one. This one is about to be superseded in favour of the boiling plates used in conjunction with thick aluminium utensils.

Auxiliary cooking is done by a Stokes table cooker; its portability and the fact that food can be cooked by it on a plate ready for table are its principal advantages.

Why Not Electric Water Heating?

At the time the house was being built, I had little knowledge of systems of hot water supply; I only knew that hot water must be available day and night, and that there must be no coal or coke firing. I was definitely "hazy" as to the amount of hot water wanted in a house, in other words I was in exactly the same position as an ordinary member of the public. The following visits were made:—

(1) Manufacturer No. 1 (London showroom) recommended a 2-gal. heater at each point, *i.e.*, three in all.

(2) Manufacturer No. 2 (London showroom) said that two gal. would not be sufficient and recommended three 5-gal. units.

(3) Gas hot-water apparatus manufacturers (at exhibition) said that the electrical suggestions as above were ridiculous and suggested a single 20-gal. storage as minimum.

(4) Gas company (London showroom) confirmed the opinion of No. 3 but suggested a newer type of heater, better suited to the small house, and recommended my getting into touch with the local gas company.

(5) Local gas company produced full details of the equipment, estimated consumption, offered to carry out the whole of the installation, *i.e.*, water as well as gas, *and guarantee it*, and finally produced an attractive hire-purchase scheme covering the whole outfit.

(6) Local electricity supply company produced price list of storage heater, but had no practical experience of it, nor would it undertake the wiring or installation. The price of the 20-gal. tank was exactly twice that of the corresponding gas apparatus.

The gas company was thereupon given the contract, and the rebate allowed by the builder, through being relieved of the responsibility of the hot-water system, was sufficient to allow of hot and cold water to be carried to one of the bedrooms, so that hot water is available at no fewer than four points in the house.

Both the manufacturer of electrical hot-water apparatus and the contractor would do well to ponder over these points. To compete with the gas interests, capital cost must be reduced and the electrician must be prepared to take the responsibility for the whole installation, and not merely fix the heater and attach the wires.

Small Appliances and Plug Points

Besides the items enumerated the following miscellaneous equipment is in use. The power consumption of these per annum is very small indeed, but their utility is tremendous: iron, suction cleaner, percolator, hair dryer, electric clock, ¼-h.p. and sundry other motors in workshop, sewing machine, and radio-gramophone.

The whole of the wiring is carried out in conduit, and "M.K." interlocking plugs are used for all skirting board points. The allocation of the power points is as follows: Dining room two, sitting room two, kitchen three, bedroom A one, bedroom B one, bedroom C one, workshop one, and landing one. The cooker, clocks, radio-gramophone, and workshop motors are permanently wired.

With the apparatus enumerated the above represents the minimum number of plug points that should be installed. It is proposed to put an additional point in each room in the immediate future.

Electrical contractors would do well to fit two- or three-point fittings as standard, thereby ensuring maximum electrical convenience with the minimum of expense

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The World's Electric Railways

According to the fifth report of the Railway Electrification Committee of the National Electric Light Association, the work of electrifying certain railroads which was started in 1928 and 1929 has continued in the past two years in spite of prevailing economic conditions.

The mileages of railway track electrified in various countries are as follows:—

Country.	Route.	Main Track.	All Tracks.
United States	2,055	3,597	4,911
Switzerland	1,542	2,105	2,929
Italy	1,079	1,620	2,218
France	1,046	1,736	2,234
Germany	972	1,647	2,373
Sweden	726	791	1,039
Austria	564	794	927
Great Britain	474	1,122	1,234
Spain	369	560	650
Australia	261	568	701
Brazil	251	272	319
Japan	248	441	569
India	222	455	680
Chile	208	242	305
Whole world	11,318	17,728	23,567

There are in the United States to-day 21 railways having some of their lines operated electrically. The Pennsylvania Railroad is now engaged in the most important electrification in the world, which will embrace 2,760 miles of track over the most heavily worked sections in existence.

Industrial Developments

Some new equipment seen at the British Industries Fair, Birmingham

GREAT BRITAIN'S appreciation of the improved opportunity in the industrial markets of the world is reflected very clearly in this year's British Industries Fair.

Both the number of exhibitors and the area covered by the displays have increased materially. Official visits are being spread over as long a period as possible and more electrical people are coming to the Fair than ever before and from farther afield.

The "Buy British" campaign and the impetus given to home industry by the measures being applied by the Government in alleviation of the prevailing economic conditions are expected to induce retailers to purchase far less foreign merchandise than they have done of late years.

The Central Board's Display

In view of the fact that the grid is to be completed this year and that energies must be directed mainly to selling the cheaper electricity which it is hoped to provide, the stand of the Central Electricity Board is of immediate national importance.

The grid has meant the provision of a great deal of work for electrical manufacturers; the Central Board's contracts had totalled £22,000,000 at the end of last year, plus £8,000,000 for frequency standardisation.

The display consists of some twenty-seven photographs which illustrate examples of the work carried out by the Central Electricity Board in Central England (area manager: Mr. C. T. Allen, Birmingham) together with a large map on a table which shows the complete main interlinking grid transmission system throughout the country.

Each of the Board's ten schemes is represented by a coloured area on the map and coloured lines indicate diagrammatically the routes of the main overhead lines and the appropriate voltages at which they will operate. Push-button switches have been provided for illuminating each individual scheme and the whole map, as required, to enable the public to study each particular area in detail.

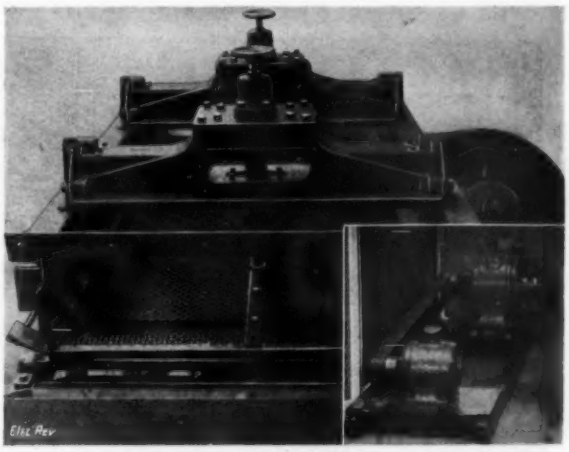
Vibrating screen in Roads and Quarry Section

A Cable Company's Exhibit

It is a new departure for W. T. Henley's Telegraph Works Co., Ltd., to be exhibiting at the Fair. The opportunity has been seized to introduce some new lines, one of which is the new insulated "Isco" service cut-out. Two tall pyramids comprising hundreds of them, with their corresponding neutral connector boxes, form decorative features of the stand and permit inspection of their construction at eye level. Several sets of neutral connector boxes, sealing chambers, &c., mounted on flyboards are on the partition. The compactness of the new type straight-through link-disconnecting boxes, 3-way and 4-way, for 3, 4, and 5-core cables for 660 V, is very noticeable.

The new disconnecting links (patent pending) adopted for these boxes have made possible the reduction in size. The terminal pillars also are of novel design and covered by a patent application. The conductor fittings are made of wrought copper, whilst the terminal pillars and busbars are completely shrouded in porcelains coloured in accordance with the B.E.S.A. recommendation. The arc shields between phases are of a rigid "all-Bakelite" construction.

A considerable portion of the display is devoted to overhead-line equipment. The l.p. pole-type boxes accommodating the overhead conductors in vertical formation are another innovation. The construction consists of a rustproofed sheet-steel trough and back plate provided with a compound tight joint of special design. The end of the trough forms the gland for the cable and a lead cone or brass wiping gland can be used as required. The conductor fittings are designed on the nut-type line-tap principle. The insulators are rectangular in shape and of brown glazed finish. Specimens of other standard items of distribution equipment appear and the "Solon" electric soldering iron is shown and demonstrated.



A magnetically operated screen

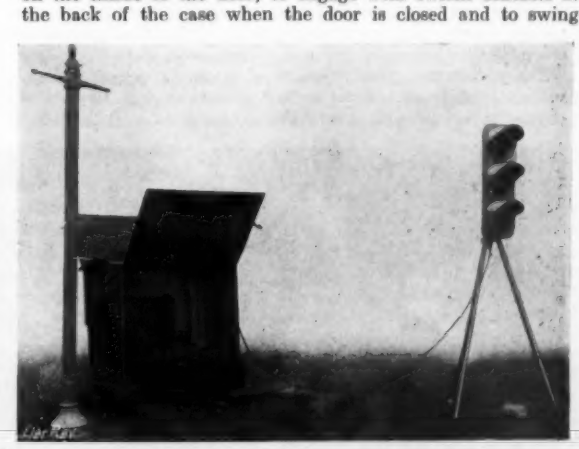
Mining Electrical Equipment

Mining gear is not very prominent at the Fair, but there are one or two new items. A recently introduced motor is made by the Lancashire-Crypto Co. It is cylindrical, without projections, and is made of steel, this shape and material having been chosen in order to produce a strong machine which is not likely to be cracked by falls of roof.

Moreover, feet or other means of attachment are left by the maker to be welded on at the colliery just when and where required for increased convenience.

George Ellison, Ltd., have installed over 1,500 certified flameproof circuit breakers of the two usual types, and their newest ideas in this line are embodied in a gate-end breaker. The model shown for the first time at the B.I.F. is contained in an explosion-proof cast-iron case with hinged door, mounted on skids. The joint between case and door is made with wide smooth machined flanges which bolt together without a gap. No relief vent is provided, as the case is strong enough to withstand the internal pressure which would be generated by the ignition of an explosive mixture within it.

A magnetic blow-out air-break circuit breaker is mounted on the inside of the door, to engage with switch contacts at the back of the case when the door is closed and to swing out with the door, completely isolated, for inspection. Connected to the fixed contacts at the back, and bolted to the rear of the case, is a detachable end fitting for the feeder armoured cable. This fitting is the Ellison patent "cable end." On the top of the breaker case, in front, a plug socket is mounted to take one or two reversible or non-reversible trailing cable plugs for connection to coal cutters, haulages



Portable traffic-control equipment

or loaders. Mechanical interlocks are arranged for the trailing cables and electrical interlocks can be provided.

Drake & Gorham have a simple type of 11-kV pole-mounted tandem-operated isolating switch. It is a three-phase model with nine insulators only, and a ball-bearing movement is provided. It has special ice-breaking contacts designed to assist correct functioning in severe weather, the knife of the switch being drawn down, so crushing any ice which may have formed before the contact is broken horizontally.

Roads and Quarry Section

In this section the few electrical exhibits do not adequately represent the large field which must exist for the application

Some Carron fires

of electric power in those districts where supply facilities are available. It is a long-hour load, and the Yorkshire E.P. Co. quotes a number of quarries very favourable terms.

A new departure in road traffic signals is shown by Chance Brothers & Co., Ltd., and is intended to control traffic during the progress of road repairs, excavation work, etc., and renders unnecessary the use of flagmen at such points. The equipment consists essentially of two one-way traffic signal units of standard pattern, fitted with "Chance 12" asymmetric lenses, and mounted on tripod supports at the regulation height, together with a power and control unit which contains a petrol engine coupled to an electric generator, batteries, automatic control thermostatically, gear for starting and stopping the engine as required, and an electric controller for determining the duration of the various signal light periods.

Each signal unit consists of a cast aluminium trough-section box, divided into three compartments, each compartment being fitted with a 25-V 60-W lamp. The door of the signal unit is also of cast aluminium, and carries three asymmetric lenses, each one giving a beam of 2,000 candle power when the appropriate lamp is illuminated.

The generating plant consists of a single cylinder sleeve-valve, four-stroke, water-cooled petrol engine of 1 h.p., coupled by means of a centrifugal clutch to a B.T.H. 25-V generator of 0.5 kW capacity. The "Fuller" battery consists of four 6-V units, having a total capacity of 129 A at the 20-hour rate.

The whole of the switchgear associated with the battery charging functions of the plant is housed in the end of the generator; the control push-buttons, selector switch, &c., being mounted on the top of the generator yoke, and suitably shrouded by a pressed-steel cover.

Also in the quarry section is a James duplex vibrating screen made by Holman Bros., Ltd. It is belt-driven by a small motor with direct-on switching by Crompton-Parkinson gear, having start-stop visual indicators.

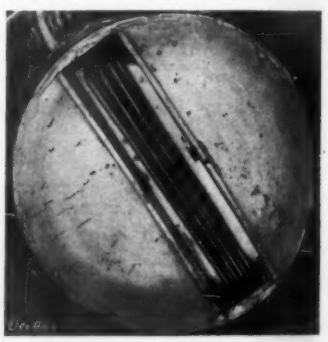
Mining & Industrial Equipment, Ltd., also has an electrically operated screen (hummer). A twin cable is all that is required, dispensing with cams, pulleys, and line shafting on dusty roads. Low-frequency is necessary, and by using a.c. make-and-break difficulties are overcome. The magnet armature just agitates the screen, the armature striking blocks on the upward stroke so as to produce the jumping effect.

The self-excited Crypto generator has both slip rings and a commutator, the former supplying the screen, and the latter the field. The "Metrovick" frequency changer is made on the same lines, two machines being electrically as well as mechanically connected.

The equipment is used for grading gravel, reconditioning foundry sand, &c., the makers stress the ease of running cables in contrast with line shafting in quarries, &c.

A Heat-storage System

The "Elaquamatic" installation on the stand of the Birmingham Corporation Electricity Department is of considerable interest. The principle of its operation is to absorb off-peak power, which is converted into heat and stored in a large container. Electrically it is thermostatically controlled automatically with additional "pressure-stat" control. The electrical heating is done by either electrodes or immersion tubes, and the stored heat is passed through a heat-exchanger which transfers heat to the circulating water.

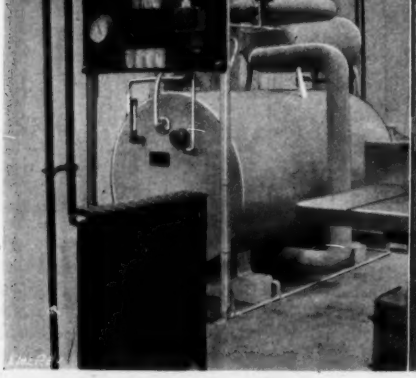


Another view of "Calrod" immerser

Circulation between the storage and the heat exchanger is controlled by magnetically operated valves, which are actuated by a thermostat in the radiator circulatory system and also by room thermostats, so that as soon as any one room reaches the predetermined temperature the magnetic valve automatically shuts.

The immersion heaters are by Archibald Low, Ltd., the control board by Mudie's Electrical Co., valves by the Magnetic Valve Co., thermostats by the Rheostatic Co., Ltd., pressure-stat by the Drayton Regulator Co., insulation by Newalls, Ltd., and the pumps by Rhodes, Brydon & Youatt.

The installation has a capacity of 150 gallons, a loading of 9 kW, and it will serve 180 sq. ft. of heating surface in radiators, which is equivalent to heating six rooms, each of 1,500 to 1,200 cu. ft.



Thermal storage on Birmingham E.S. Dept.'s stand

Industrial switchboard (Berry's Electric)

11-kV gear by Drake & Gorham

Improved "Magnet" thermal storage cooker

Domestic Cooking and Heating

Observations on some equipment at Castle Bromwich

A TRUE perspective of domestic development can no more be gathered from a collection solely of manufacturers than one solely of supply men, but there is ample evidence at Castle Bromwich, Birmingham, that things are far from what the doubters, particularly the cooking doubters, would have us believe.

Perhaps it is not a bad thing to meet the makers occasionally in an unmixed atmosphere—one can hear complaints that are not generally voiced on the common ground. For instance, it was hinted that generally manufacturers were not free to give the consumer what he wanted, but were compelled to provide what the supply engineer thought he wanted or ought to have.

Who is the Customer?

It is rather a peculiar state of affairs. The man to be served is the consumer, but the manufacturer's customer, on the whole, at any rate for cookers, is the electricity undertaking, by virtue of the fact that the bulk of the business is done through hire and hire-purchase schemes. Obviously the maker is anxious not to displease the man from whom he gets his orders, and with his eye on ultimate business he is equally anxious to satisfy and hence make consumers.

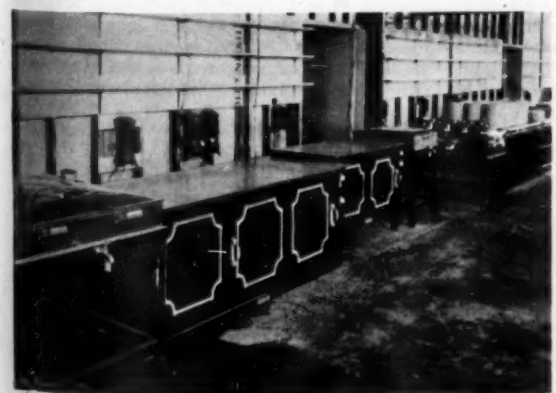
The supply engineer has to bear the brunt of maintenance, however, and he must be heard, but it does seem that there is room for more free discussion on this point, and for better representation of the consumers' point of view.

Bearing on this it is worth recording that we saw only one "British Electric Cooker" at the Fair, and that this result of efforts at standardisation during the past few years was not mentioned by one of the exhibitors who sent us particulars of their displays in advance. Not until there is agreement in spirit as well as in word between undertaker and manufacturer will anything like real standardisation be possible—and the suppliers' views must be based on an understanding of the consumers' requirements.

The Storage Cooker

Since the last show at Castle Bromwich 24 samples of the model then shown of the "Magnet" thermal-storage cooker have been tried out and criticised by supply undertakings, with this year's exhibit as the result.

Being able definitely to budget his cooking expenses in advance should interest the consumer and so should the reduced tariff called for by a 24-hour load. Is there a supply engineer left to-day who would not give much consideration to the possibility of such a load? A G.E.C. representative talked mostly of the possibilities in rural areas—but why stop at that?

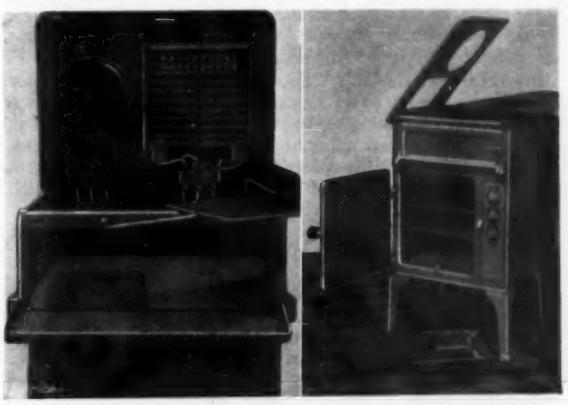


The electric kitchen at Castle Bromwich

Because of all that has so recently been said, with many irrelevant wanderings, about boiling plates, one is tempted to skip this question, but there is more of novelty to be seen and heard at Birmingham in connection with hot plates than with any other domestic apparatus.

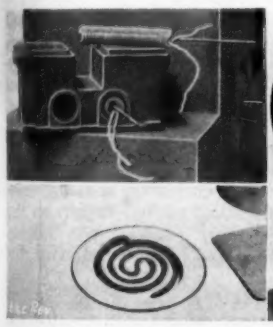
Again the Boiling Plate

Since our last general review of the situation in June, 1931, arising from the I.M.E.A. Convention at Scarborough, there have been at least six major, and in certain cases somewhat revolutionary, developments in boiling plates—which will provide food for thought to those who suggest that things have reached a dead end.



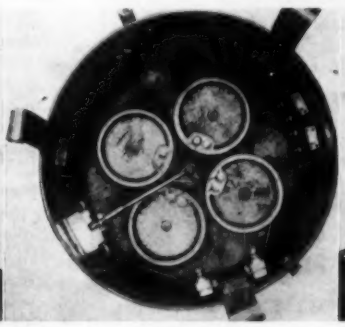
Boiling boiler-grill and the "Creda" C.293 cooker

The most drastic move is that of Mr. Gilbert (Berkeley & Young, Ltd.), who has revived induced-current cooking, with the open link in the transformer core instead of in the utensil. This is almost too new a development for any very definite impressions to be formed, and is not yet on the market.



(Above) Thermal storage-cooker (Below) Revo "Superspeed" coil

"Cookquik" plate



Jackson wash-boiler

Kettle for use on hot plate

Possible criticisms are that the consumer will consider the utensils with their heavy links cumbersome, and that the lever at the side of the cooker will introduce space difficulties. But the performance claimed—two pints of water boiled from cold in 4¼ minutes—will undoubtedly command a great deal of attention.

Psychology and Actuality

It was rather a shock to hear half a dozen or so manufacturers all talking about the psychological effect in connection with boiling plates, meaning that if the housewife or cook sees her plate or elements red-hot she will be persuaded to believe that she is getting better service. From one given article—plate cover or element coil—more heat will be obtained from it the hotter it is—but away with pretence. The "psychological effect" bogy has had much too long a run with electric heating; the industry should not make another rod for its own back.

The new "Cookquik" plate which Aidas Electric, Ltd., are fitting to their Moffat cookers is "closed," but without embedded elements, and it runs with its exposed surface (cover) at red heat. It is a simple affair; on a cement slab contained in a shallow metal cup is placed fairly loosely the element spiral in fireclay formers. Over the whole is a cover of special alloy which will not buckle. Screw-bolts pass right through the whole and clamp it. Grooves in the cover are scientifically designed to afford "correct air circulation." The terminals are fixed, *i.e.*, not plug-in. The coil alone is easily replaceable.

Strictly speaking, the new " Calrod " plate of the Hotpoint Electric Appliance Co. is closed. Its spiral is embedded within steel tubular coil. But there is little metal, and the magnesium oxide is claimed to be an excellent heat conductor. This also operates red-hot.

In Belling's boiler-griller there is a suggestion that a form of the open-type element (high voltage) may be right after all. There is a perforated cast-iron top, and the spirals are directly under the holes. Apparently there is a great deal in having the perforations the correct size.

The company is confident that the normal life of the plate is two years, but if it can be rewound with a new spiral for half a crown a burn-out is not a serious matter—if it is a rare occurrence, of course. The efficiency is regarded as 20 per cent. higher than that of a closed plate (embedded type), using the same element.

The " Superspeed " Plate

The Revo Electric Co.'s " Superspeed " has undergone some interesting changes. The element is now in coil form (non-inductive) of flat section, thereby increasing the radiating surface for the same loading, reducing the core temperature, and hence increasing the safety factor. This change in design is the result of the use of polished-bottom utensils, which reflect heat back into the element.

The new section enables the coil to be brought closer to the utensil; it also affords better clamping at the end contacts. The new china portion is such that the utensil cannot " short " the turns, and by virtue of knife edges on which the strip rests heat losses to the china are reduced. Although the essential object was to increase the safety factor, the new design has resulted in increased boiling speed by about 15 sec. on a one-pint boil.

Generally there is not the same enthusiasm over plug-in elements as was the case a year or so ago. It is asserted

New Ellison flame-proof circuit breaker

that after a year's run without removal the plugs become practically a fixture.

One of the new " No. 60 " Jacksons was seen fitted with a " Chromalox " plate, and the reason given was that there is a demand for round plates because of the prevalence of round cooking vessels.

Special Utensils

There seems to be unanimous approval among manufacturers of closed (embedded) hot plates about the special utensil. With such utensils the closed plate is *the* quick plate was more than once heard. Indeed, some makers of other types of plates agreed with this.

It was interesting to learn from Messrs. Hague and McKenzie that there is almost a law defining the relation between the comparatively thin uniform sides of the utensils and the thick machined bottoms. It seems reasonable that if the utensils have machined bottoms the plates should have machined tops, and Mr. Veitch agreed that there was room for co-operation between the utensil and plate manufacturers on this point.

By the way, the element kettle for use in a boiling plate, referred to in the " Still the Boiling Plate " correspondence, was seen on Messrs. Bulpitt's stand, as also was a coffee percolator, an ordinary non-electric vessel with a machined bottom, for the same purpose.

Messrs. Buncher & Haseler, Ltd., also told us that they are experiencing a gradually increasing demand for their thick- and ground-bottom utensils.

Cookers Generally

Apart from boiling plates there is little new in cooker design —the electric cooker is a sound job. The new " C.293," supplementing " No. 3 " model " Creda," has some interesting features, chief among which is that the oven elements (top and bottom) are inside the vitreous-enamelled oven interior. The switchbox is incorporated in the framework, and there is a hot cupboard door. The hob is hinged on the left-hand side to the casting, a sounder job than fixing it to the sheet-iron back.

We were impressed by the hinged splash plate on a new Moffat table cooker. It can be lowered to cover the hob, when it forms an excellent enamelled table top. Closed down the general appearance is very clean and neat. Under the hob is a warming drawer which also makes good storage for the smaller cooking accessories. Another interesting point is the visible fuses, in " Pyrex " glass under the switches.

Space Heating

This is not being tackled as it should. Fires abound of all sorts and sizes, with all manner of beautiful finishes—but generally they seem to be too much of a sideline. There are some really wonderful imitation coal and log fires, and after seeing a number of Berry's " Magicoals " one had to think: " Is there something in psychological effect after all?" But is not the effect question more in the nature of a lighting problem?

There has been a move forward in the combination of radiant and convected heat in the same fire, and it was particularly interesting to hear a manufacturer of only wholly radiant fires say that a certain combination fire was undoubtedly the best fire, as a space heater, on the market.

On the stand of Messrs. Geo. Bray, Ltd., we had the opportunity of inspecting the convection arrangements in the " Circle-Glow " fire of the Artic Fuse & Engineering Co., Ltd. A " Chromalox " strip element is clamped horizontally between finned units. Air passing between the fins absorbs heat radiated from them.

Reflector Fires

Diversity of opinion exists regarding reflector and non-reflector radiant fires. Jackson's say, for instance, that a person can have " direct heat " 12 ft. away from a reflector fire, but not from a non-reflector one. Their representative also has some decided views on the imitation-fuel fire with a reflector in one unit. There is a limit to the overall size, and to get a good imitation-coal effect it is necessary to sacrifice the size of the reflector, and hence efficiency.

Apart from the exhibits of J.P. Tubular Heaters, Ltd., and Vulcan Heaters, Ltd., little was seen of this type of apparatus, as exhibits, although there are three interesting tubular heating installations in the Royal Room, special committee room and the special dining room. These are all " Creda " jobs, and in the Royal Room the five groups of three-tier 17-ft. heaters operate in conjunction with eight 2¼-kW " Eros " and " Electra " imitation-coal fires.

Incidentally we learned that the Credenda Co. is rather keen on the combination of radiant fires and tubular heaters as the correct way to tackle the space-heating problem, with thermostatic control for the tubes and tariffs consistent with the long-hour demand.

Water Heating

All the makers of water-heating equipment reported, in effect, that equipment was selling well, considering the lack of suitable tariffs, but supply undertakings were gradually appreciating the possibilities of the load.

Jackson's sales of immersers have fallen but their output of storage heaters has increased at the same rate. They attribute this to the necessity of often having to heat up more water than is necessary in existing tanks.

Berry's Electric are pushing the " Canvary," but they find there is certainly a demand for both the pressure and free-outlet types.

Wash-boilers

An interesting view of Mr. Nesbitt (Credenda) is worth the consideration of supply men. The wash boiler is an ideal means of levelling up the gap in the cooking load on Monday—cold-dinner and washing day. His company is introducing a new series of boilers, and, with confidence in the above idea, will push them energetically.

The Jackson Electric Stove Co. exhibits a boiler fitted with four 800-W " Chromalox " rings. These are of the half-sheathed type, *i.e.*, without the top cover, and they are clamped directly to the bottom of the vessel. A brass stiffening plate is placed inside the container and clamping between this and the domed plate below the ring is effected by a central bolt with a cone-in-cone union connection with the boiler bottom. Another new feature is an automatic device of the type used in the maker's kettle.

In the new Hotpoint wash-boiler the " Calrod " (copper-sheathed) element is contained in a well in the vessel bottom. The well is fitted with a draw-off tap, in addition to the usual tap at the normal bottom level of the boiler.

MEETINGS AND DISCUSSIONS

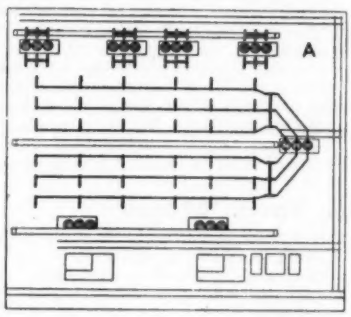
Current Topics and Opinions Expressed at the Institutions

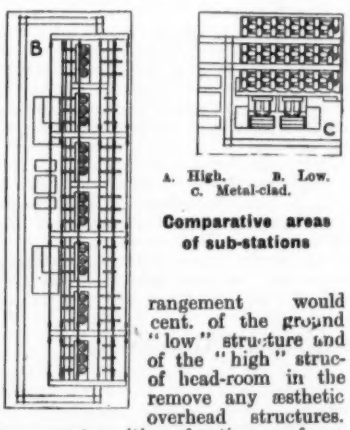
Mechanised Switching

PROGRESS in the design of metal-clad switchgear, automatic protection and remote control during the last seven years is outlined in the long paper which Mr. H. W. Clothier read at the INSTITUTION OF ELECTRICAL ENGINEERS in London yesterday, February 25th.

The construction of the various types of metal-clad switchgear is diagrammatically represented by illustrations brought up to date and concluding with a forecast of the full application of the principle of complete enclosure and immersion of all conductors and insulators for all voltages to safeguard life and property, and secure continuity of supply.

Certain basic constructional features are dealt with more fully. These are, in general, typical of changes brought about by research and practical experience, and also evolved in the quest by designers for something "different" in a period of intensified competition. An attempt is made to classify the prevalent forms of arcing contacts and busbar enclosures, and to state the effects of such details, particularly of the latter, on the general lay-out of the whole switching equipment.





A. High. B. Low.
C. Metal-clad.

Comparative areas of sub-stations

SAVING SPACE

The use of metal-clad switchgear has effected such economy in buildings that outdoor switchgear has not been widely used in Great Britain; but reasons are given in favour of outdoor construction. A comparison with the Central Electricity Board's types of sub-station indicates that possibly the metal-clad arrangement would occupy about 20 per cent. of the ground area of the present "low" structure and 45 per cent. of that of the "high" structure. The reduction of head-room in the sub-stations would remove any æsthetic objection to obtrusive overhead structures.

The author reviews the present position of rating, performance, and selection of circuit breakers, and results of tests in a British 1,500,000-kV testing station are recorded as examples. Some ways and means of effecting economy by the reduction of components are proposed. The known protective systems are reviewed, and some new developments are mentioned.

Some original research is recorded for the avoidance of interference with the operation of telephone conductors arising from accidents on main lines. Further, the resistance of heavy arcs has been experimentally ascertained, with a view to making clear the necessity of using reactance instead of impedance as the true means of measuring distance for the accurate location and discrimination of faults in the distance types of protection.

SOME MODERN CONTROL SYSTEMS

In the Bradford Corporation's station controls for the boiler fans, dampers, and stoker motors are arranged on a board together with the steam-valve controls, thereby providing centralised operation of the whole of the extra-high-pressure steam plant. There is complete desk-control in the e.h.p. turbine room of the 1,100-lb. electrically operated boiler plant; a diagram of the steam connections could be readily added.

The London Power Co., Ltd., uses the Bennett system at Ergon House. In conjunction with diagrams engraved on metal panels, signal lamps are operated from a desk keyboard on receipt of information by telephone, and remotely operated instruments indicate the load distribution continuously.

The short-circuit calculator is the latest addition to control-room equipment. It consists (South-East England grid section) of a group diagram representing completely the inter-linking of all power stations and distributing points. Each unit of the generating plant, reactances, and network is represented in miniature by a resistance proportional to the impedance of the actual circuit which it represents. The diagram is therefore adjustable to represent any quantity of running plant and any condition of premeditated or actual switching. The switching connections are represented by dual-conductor plugs, each circuit being of the dual type in order to enable both earth-fault currents and phase-fault currents to be determined. A complete picture of all connections is seen at a glance, and the short-circuit current that would occur in any vicinity can be read straight off on a portable instrument, which can be plugged in to the position of any of the switches.

THE "CENTROVISORY" SYSTEM

As distinct from telephone-relay "supervisory" control the "centrovisory" system centres upon a control dial with mechanism more on the lines of switchgear; numerous small relays and their electrical circuits are replaced by mechanical devices and a few robust relays. Transmission of the meter readings is effected by signals from the controlled station, their duration corresponding to the time taken by a pointer driven by a timing device to traverse a distance from a fixed zero point to the position of the pointer on the measuring instrument. In the control room another pointer, similarly driven, makes indicators and recorders tally with those in the distant controlled stations.

Thus in a regional "centrovisory" control room the following 132- and 66-kV services are provided:

(1) Premeditated switching superimposed by hand on a system diagram; (2) automatic indication and comparison with (1) of the position of each circuit breaker; (3) alarm signal when a change of condition occurs, followed by automatic indication (2); (4) indication of the position of all transformer voltage-tappings; (5) alarm signal when any transformer tap-position is changed; (6) indication of kW input or output through the transformers and feeders; (7) indication as in (6) of the reactive kVA; (8) indication of voltage at selected positions on the system; (9) indication in kW of the total generator load at various stations; (10) transmission of stereotyped instruction-signals from the control-room to various controlled stations; (11) telephone facilities from the control-room to all controlled stations and extensions; (12) automatic lock-out on failure of pilot, or by key at will.

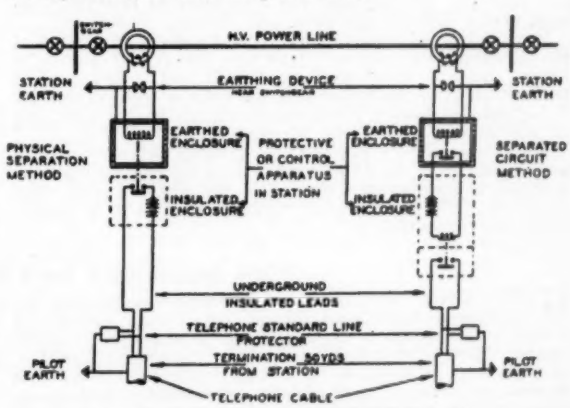
ITS OUTDOOR EMPLOYMENT

Equipment with similar dials is now being used for the remote control of outdoor transforming stations so distant from an available control-room that the additional initial cost of the control is more than compensated for by the saving in the multi-core cables that would be required for ordinary remote control. The control then includes, as an additional feature, the remote operation of circuit breakers and transformer taps, and thus advances a stage farther in the direction of complete "centrovisory" control.

The time is not far distant when regional control schemes will incorporate not only the direct operation of equipment by the control engineer, but also the further use of automatic control for maintaining constant frequency, giving the possibility of a time service and securing efficient interchange of load on the network. There will also be an indication, prior to actual switching, of what will be the effect of the switching.

SAFEGUARDING TELEPHONE SYSTEMS

By their introduction into protective systems and remote-control systems telephone pairs and channels become electrically associated with the power lines.



Arrangements to protect telephone circuits

Failure of insulation in the transformers, which is a rare occurrence, directly raises the potential of the secondary circuits, but in addition, when an earth fault develops in this or any other part of the power circuits, momentary potential differences are set up because of the resistance of the earth-return path, and this also raises the potential at some part of the telephone-cable sheath above that of the enclosed conductors.

Research has proved that definite precautions are necessary for ensuring safety and non-interference with telephone service. These involve the use of separate earthing devices for the secondary circuit and, as further safeguards, either "physical separation" or a "separated circuit" in the association between the secondary circuit and the telephone cable, and a separation of the telephone cable earth from the main earth-plates of the power network.

The Distribution Problem

IN proposing the toast of "The Electrical Industry" at the annual dinner of the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS held at the Trocadero last Saturday, Mr. J. M. Kennedy, M.B.E. (vice-president, I.E.E.) asked whether the present organisation of distribution was suited to present needs. If not, he said, it must give place to some other kind of organisation.

Out of eight million possible domestic consumers, three and a half million were now connected to the mains. There were still 40,000 sq. miles of rural areas with over 100 inhabitants per sq. mile without any electricity at all; the cost of electrifying these areas would be about £30 million, and the work ought to be done.

To connect three million consumers in all areas in the next five years would cost some £60 millions, would employ 120,000 men, and call for three million tons of coal per annum, while reducing the value of imported paraffin by £6 million.

There was a vast scope for power and heating in industry, and also on the railways, where the electrification of lines with the densest traffic would yield a return of over 10 per cent. after meeting full depreciation.

CONTROL OF THE TELEPHONE SERVICE

Sir Wm. Noble, responding, said that he had seen in New Zealand 200 cows electrically milked in an hour by four men, where formerly two dozen men were required. He claimed that the British telegraph system was the best in the world; its business was falling off, but it would always be required by those unable to install the telephone. Telephony was as important as power transmission. The magnitude of the system warranted its being run as a special department by men who knew the business. Controlling bodies similar to the Port of London Authority, the B.B.C., or the Electricity Commission, would, he considered, be unsuitable.

CREATING A DEMAND

Mr. A. C. Cramb (director, E.D.A.), also responding, pointed out the need for rapid development if the grid were to become a success. Some undertakings were out for quick profits and relief of rates; the industry had not yet got down to the work of selling electricity as cheaply as possible consistently with good service. The duty of salesmen, who should be taken from the best of the younger men and women, was to *create* a demand. It was a serious reflection on the industry that the demand had hitherto come from the public itself. Standardisation of frequency and voltage would be essential.

Mr. G. Scott Ram, O.B.E. (president, A.S.E.E.) proposed the toast of "Our Guests," and stressed the need for simple tariffs. Sir Cyril Kirkpatrick (president, Inst.C.E.) and Major Hogan responded.

The award of the shield for technical papers submitted was made by Mr. W. E. Highfield, the donor, to Mr. D. J. Williams, who had won it for three years in succession. Prizes were presented to Messrs. W. R. Durtnall, A. D. Goodin, and J. W. Hutchings. Thanks on behalf of the Association were returned by Mr. L. W. Medcalf (vice-chairman).

Electricity on Farms Saves Money

SOME of the numerous applications of electricity to farming operations and horticulture are dealt with in the paper which Mr. F. E. Rowland read to the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS on February 16th.

The advantages electric motors have over oil engines are stressed. Directly coupled machines have valuable features and, although they may not be generally adopted at present, their use in future will undoubtedly extend. Fractional h.p. motors can be used for a large number of purposes; they are particularly convenient, as it is possible to plug them into any available circuit.

The largest drive required at present is for threshing, for which 15 h.p. suffices in most cases. Recently one farmer threshed electrically for three and a half days and produced 60 quarters of wheat, 100 quarters of barley, and 40 quarters of oats. The total consumption of electricity was 243 kWh, for which he paid 1d. per kWh.

There was an annual fixed charge based on the acreage of the farm, raising the price to about 2d. per kWh, which resulted in a total expenditure for electricity of £2. Steam threshing would have cost £2 per day, a total of £7, and, in addition, with electric threshing only seven men were employed instead of eleven. Consequently, three and a half days' threshing showed a saving of £5 and the wages of four men. The equipment consisted of a 15-h.p. portable motor driving a 54-in. thresher with self-feed and an elevator.

One farmer in particular who has been very hard hit by the present depression had stated that, if anything, it was more important to have electricity installed in bad times than in good, because of the increased efficiency and convenience of electric drive and electric lighting.

A farmer can enter his buildings on a dark morning, switch on his light, start his motors, and be at work with the same expedition as in daytime and work under similar, or even better, conditions.

Applications of electricity to poultry farming, horticulture, and in farm dwellings are referred to. The author's experience has been that the majority of farmers will use electricity as soon as it becomes available. As soon as there are signs of an improvement in the agricultural situation and money is freer with farmers than at present, the development of agricultural electrification will proceed rapidly.

The Cost of Electro-medical Appliances

AT an informal meeting of the INSTITUTION OF ELECTRICAL ENGINEERS on February 15th, Mr. G. G. Blake opened a discussion on electro-medical appliances in general, but dealt mainly with diathermy equipment. His lantern slides and apparatus demonstrated the importance of intelligent design, precise voltage regulation, and adequate construction.

As regarded the manufacture of this apparatus, he said that the foreigner, less able to ignore new methods of earning a living, had got ahead and established this industry on a large scale. The result was that the price of well-constructed British electro-medical apparatus was much higher than that of the equally well made foreign article.

Mr. C. M. Davies said that in general electricity supply authorities never put in adequate mains for dealing with the demands of medical apparatus. The load was, of course, very spasmodic, but the service it rendered entitled it to receive favourable consideration.

Dr. B. J. Leggett said that there should be much closer co-operation between electrical engineers and the medical profession. Most doctors were too busy with medical matters to keep alive to electrical developments, but no doctor without recent electrical knowledge should practice as a medico-electrician. He did not agree that foreign apparatus predominated in England, though there was plenty of need for more research and enterprise by British firms.

Mr. A. F. Harmer remarked on the extraordinary differences in prices of the same apparatus sold as engineering and as electro-medical plant, the medical service often being grossly overcharged.

Mr. R. Grierson asked what was the legal position with regard to accidents, and was informed that the victims of misadventure with electro-medical apparatus had redress if injured by a qualified man, but none if the practitioner was unqualified.

Can Selectivity be Obtained Satisfactorily?

FREQUENCY limits of 50 and 5,000 cycles per second are considered quite good, except for talking pictures in which the tendency is to provide full response up to 10,000 cycles. More difficult than the limiting frequencies, however, is uniformity of response, for a highly trained observer (not necessarily musical) may detect at particular frequencies accentuations, or the reverse, which the ordinary person would not notice.

"Musical" people are sometimes even the least critical of all in this respect, owing to their peculiar power of imagining all the missing parts; just as in an ordinary telephone conversation the listener himself provides anything up to 50 per cent. of the intelligibility.

No solution of the problem can be satisfactory unless it is given in terms of quantities capable of reasonably exact measurement. What shall be the quantities, how shall they be measured, and what shall be the specified limits in each case?

In these introductory remarks to the discussion on this subject which took place before the Wireless Section of the INSTITUTION OF ELECTRICAL ENGINEERS on February 24th, Prof. C. L. Fortescue expressed the opinion that some arbitrary maximum frequency-range of, say, from 50 to 10,000 should be taken, and at least two figures of merit should be used to characterise the receiver, viz.—(*a*) a figure giving the area of its response curve as compared with the ideal; and (*b*) a figure representative of the uniformity of response over the active range of frequency. In each case the response must, of course, be measured in actual sound intensity from the loud-speaker for a given high-frequency input.

UNBALANCED RECEIVERS

Is it not beyond question that the limit of selectivity of a broadcast receiver is solely determined by the range of audible frequency notes for which it is designed? And is not any denial of this tantamount to endowing the receiver with some imaginary quality enabling it to examine incoming waves of a given frequency and to say "This one is mine, that is not"?

There is a good deal of evidence that many receivers are unbalanced in the sense that high-frequency components are received over a far wider range of frequency than is reproducible in the audio-frequency stages or in the loud-speaker. For instance, a receiver tuned to a high frequency of 10^6 (λ=300 m) may respond to the extent of perhaps 30 per cent. to frequencies which are 50,000 above and below this central value, and yet the loud-speaker may be limited to a frequency only just above 2,000.

It would obviously be more satisfactory to limit the high-frequency range to 30 per cent. at a departure of, say, 5,000 cycles per second from the central frequency. The needs of the loud-speaker could still be met and the energy received from other transmissions would then be negligible.

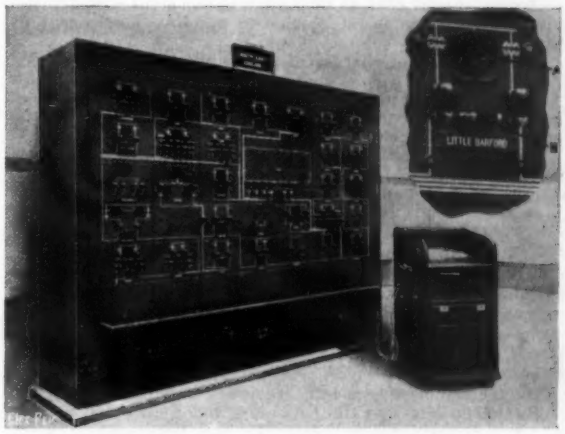
The ideal high-frequency response curve could be realised to within a few per cent. only by means of a complicated filter, which is both expensive and difficult to adjust if provision is to be made for more than one wavelength. A two-coupled circuit with its double-humped response curve can be made to give a fair approximation, but it involves tuning two circuits and adjusting the coupling to give the best results. Some reaction may also be necessary. A single circuit of high decrement can easily be made to give practically a uniform response over the required frequency range, but, as already mentioned, is subject to unnecessary interference.

A Compromise

There seems, therefore, to be no way of obtaining the ideal characteristic on the high-frequency side alone that is not open to objection. The simplest arrangement is undoubtedly the single resonant circuit, but when the decrement is sufficiently low to avoid interference by transmissions on adjacent wavelengths the higher-frequency side-bands of its own programme are themselves seriously reduced. Audio-frequency correction in the same sense thus becomes necessary on account both of the high-frequency effects and of the characteristics of the loud-speaker.

It may be reasonably easy to accomplish one of these corrections without undue complication, but is it possible to compensate satisfactorily for both of them? Alternatively, since the loud-speaker causes the most serious errors, is it not possible so to reduce the decrement of the high-frequency circuit that interference is relatively slight, and, in doing so, to reduce the high-frequency side-bands only to such an extent as will result in the errors being small compared with those of the loud-speaker?

This aspect of the selectivity problem thus seems to depend mainly on the loud-speaker. When its errors are reduced, the correction for the shape of the resonance curve will be more important.



A. Representing switches. B. Representing generators

Short-circuit calculator in the S.E. Section of the grid referred to by Mr. Clothier in his I.E.E. paper. (*See page* 309)

There are neither theoretical nor experimental grounds for any hope that the general use of selective receivers would enable the difference of wavelength between transmissions to be reduced.

Talking is Not Salesmanship

AT Caxton Hall, Westminster, on Friday, February 19th, Mr. Wallace Attwood, sales consultant, spoke on the essential principles of salesmanship, under the auspices of the British Electrical Development Association. Mr. A. C. Cramb (Director of the E.D.A.) presided.

Mr. Attwood urged the salesman to regard salesmanship not so much as a selling, but a buying, process, for by so doing he appreciated the better the point of view of the buyer. The particular kind of selling, or buying, dealt with was that in the showroom.

The first task of the salesman was to create confidence in the buyer; the second was to sell the product, which involved the demonstration of its usage value to the buyer—in other words, to sell performance; the third was to convince the prospective buyer of the profit which would be derived from the use, comfort, and convenience of the product. Then the fourth step was to close the sale by getting the customer to accept the price.

The lecturer elaborated the manner in which these various steps in the process should be effected. The important factor in regard to the first step was the method of receiving the "prospect."

The Place of Personality

In warning salesmen not to have too much to say, he urged that selling did not depend upon the "gift of the gab," but was mainly a listening matter, for the buyer usually wanted to unload herself of her thoughts as to her needs.

Mr. Attwood's view was that personality counted only in this first process, and that then the buyer's attention must be directed to the product under discussion and to its usage value. Each buyer must be particularised, and it was well for the salesman to find out, if possible, the motive for buying.

Too much demonstration was boring; the purpose was to translate selling points into terms of usage value in the home of the particular customer.

In the third stage the salesman had to paint a word picture in which the buyer could see herself surrounded by the additional comfort, convenience, utility, and so on, resulting from the acquisition of the product. This had to be contrasted with another picture showing the circumstances existing without the product—and the gap between the two should be as great as it was possible to depict it.

If all this were done, then the question of price lost much of its importance. The practice of displaying price tickets on every product in a showroom was not one which commended itself to Mr. Attwood, because a housewife was likely to feel at once that she could not afford it, and did not wish to listen to a salesman lest she be tempted to buy.

Some Varying Views

A brief discussion followed, and in the course of it Mr. Howell challenged Mr. Attwood's views that personality did not count very much in selling. He was inclined to the view that a salesman was born and not made.

Mr. Attwood, whilst agreeing that, other things being equal, the man with the better personality should make the better salesman, said that even if one were born with personality, something had to be added to it.

The point of view expressed by Mr. Howell was subscribed to by Mr. Jones (of Messrs. J. & E. Hall, Ltd.), who pointed out that to attempt to train for salesmanship a man without personality was to start with indifferent material. He added that he would have liked Mr. Attwood to have demonstrated selling by a salesman who had to call upon people at their homes, who, having no pre-conceived notion or desire to buy any of the products he had to sell, were not quite in the same category as those visiting the showrooms, whose interest was already aroused.

A Case for Railway Electrification

SIR PHILIP DAWSON, M.P., in an address delivered at the Birmingham University last Wednesday, differentiated between two aspects of traffic: (1) the handling of large numbers of passengers for short distances in densely populated areas; and (2) transportation of passengers and goods for relatively long distances. The only point in common is that the system of electric traction should be suitable for both.

In the first instance, the object of electrification is to increase receipts with improved services without materially increasing operating costs; in the other the object is to reduce operating costs enough to show a satisfactory return on the additional capital involved, reduce charges, and improve services to meet road competition.

Regaining Lost Traffic

If the average speed of the trains is high and the intervals between them small, experience has shown that only through electrification can railways regain lost traffic and also create new traffic.

Comparing the S.R. electrified services with the steam suburban services of the L. & N.E.R. we find that, whereas the 12-mile journey to Surbiton averages 21 min. with five to six trains per hour, the 12¼-mile journey to Potters Bar takes 37 min. with intervals of from 60 to 90 min. To travel to Guildford (30 miles) requires 50 min. with four or five trains per hour, but to Bishop's Stortford (30½ miles) up to 1½ hours with intervals up to 105 min.

Where Savings are Made

The financial benefits of electrification are due to: (1) increased average speed; (2) greater frequency of trains; (3) increased carrying capacity; and (4) increased terminal capacity (up to 200 per cent.). In addition, a material improvement in the value of land takes place within reach of the railway services.

For main-line working electricity was originally introduced to overcome ventilating difficulties in tunnels and to increase the capacity of lines having heavy gradients, but material savings in operation costs were found to result.

The items of expenditure affected by the system of haulage amount to about 30 per cent. of the total annual expenditure. They comprise locomotive running expenses, traffic expenses (guards, fuel and lighting, cleaning, lubrication and shunting), maintenance of structures, and permanent way, and of telegraph and telephone lines, painting of passenger coaches and a portion of the maintenance of rolling stock. The total annual expenditure of the railways represents some 13½ per cent. of their total capital expenditure.

The load factor obtainable upon any large section of our railways would be about 50 per cent., for which energy could be supplied at the bus-bars of the selected stations at 0.25d. per kWh. Adding charges for transmission and conversion to d.c. (including capital charges on lines and sub-station plant), the railway companies would be able to purchase d.c. energy at 0.55d. per kWh at suitable points.

Adding again the charges of conveying the energy to the tractor (including capital charges of the equipment) the cost per kWh delivered to the motors would be a little under 1.18d. per kWh, as compared with 1.05d. per 7 lb. of coal in the tender, the equivalent of one kWh.

The operating costs of electric locomotives expressed in percentages of those of steam are: Repairs, 40; cleaning, 33.3; supervision, 66.6; lubricants, 33.3; stores, 50; crews, 40 to 70 (depending upon increased distances run). A reduction of 5 per cent. in the cost of maintaining the permanent way may also be expected.

An investigation into the cost of electrifying a considerable section of one of our railways showed that the costs of electric tractor haulage (taking account of the train crews) could be expressed as percentages of costs with steam as follows: Local and slow goods, 59; long distance and fast goods, 78.5; local passenger (excluding purely suburban), 54.7; and fast long distance passenger, 64.

A Long-Term Scheme

A large electrification scheme would take some years to complete, during which the money otherwise spent on steam locomotive repairs and renewals could be devoted to the purchase of electric tractors, and displaced steam locomotives could be utilised on other sections.

Of the total capital spent on tractors not more than half should be debited to electrification. On this basis an independent estimate of the cost, per mile of single track, of all equipment for conveying electricity from the sub-station d.c. bus-bars to the tractors gives £3,900 and of the tractors £1,100. The total capital cost of complete electrification would amount to 20 per cent. of the present capitalisation, but the haulage would be more flexible and the handling capacity would be increased by about 50 per cent.

Where Commercial Cooking is Possible

IN the course of the discussion at the Institution of Electrical Engineers on February 18th on Dr. Settle's paper on commercial electric cooking (reviewed in our last issue), Mr. R. S. Downe said that the Brompton and Kensington Co. ran an electric restaurant between 1913 and 1926, selling 740,000 meals; the annual consumption was about 250 000 kWh.

It was necessary to have a specially trained staff to deal with commercial cooking, and there must be standardised equipment for hiring out. There was one case in London with an unrestricted cooking rate of ½d. per kWh.

Mr. V. C. Hardy testified to the success of electric cooking at Dorchester House Hotel, but said that there was great difficulty in educating the chefs. He believed that the change to electric cooking would be made much more quickly than the change from coal to gas. A good point to make was the close approach in essentials of electric cooking to gas.

Solidity was the chief thing to aim at in construction of the apparatus since it received very rough treatment. The necessity for speed had caused the adoption of gas for boiling, but no doubt a suitable electric boiler would soon be available.

The loadings of the ovens were first of all increased, as the chefs complained of the time taken in preliminary heating. Gradually they were reduced unknown to the staff; thus an 8-kW loading had been decreased to 5 kW.

Employment on Trains

Mr. W. Ellerd Styles gave figures for meat shrinkage of 11 per cent. with electricity, 31 per cent. with gas, and 29 per cent. with coal.

Mr. B. Tandy mentioned that the installation at Euston station, which was 18 years old, consumed one kWh per hot meal. The L.M.S. Railway had not yet equipped any trains with electric cookers owing to the high cost of accumulators.

Mr. W. A. Gillott had found plug-in elements satisfactory when correctly designed. Chefs, he said, should be instructed in switching—not in cooking. In one case the consumption at first was 300 per cent. above the estimate; when the services of a demonstrator were accepted the consumption fell below the estimate. Nine trains on the L. & N.E.R. were fitted with electric cookers, which could also be plugged in to the station supplies.

Mr. J. J. McKenna drew attention to the large amount of business to be obtained in fish-frying, but difficulties existed in designing apparatus that would be both speedy in heating and yet would not burn the oil.

Cost Comparisons

Mr. S. J. Benham advocated an ample vent in ovens to prevent the food becoming discoloured by the steam given off. He thought that in many cases gas would be advantageous for boiling. Electricity at ½d. per kWh should be compared with gas at 8d. per therm, and we should try to get down to ½d. per kWh.

Mr. C. M. Fiander said that taking gas at 550 B.th.u. per cub. ft. and at 8d. per therm, with electricity at 1d. per kWh the efficiency ratio of gas to electricity would be 27.5/100, whereas figures recently quoted from a German source gave the ratio as 81/100.

Mr. J. I. Bernard referred to some tests made on roasting ovens in the U.S.A., which showed that the waste heat with gas amounted to 1.4 kW per sq. ft. of oven against 0.2 kW with electricity. If the oven measured 24 sq. ft. and the kitchen 40 ft. by 30 ft. by 10 ft., and the air were changed every three minutes, the use of gas would raise the temperature of the air by 23 deg. F.

Standard Overhead Lines

A DISCUSSION on "Standardised Lines" took place at a recent meeting of the Overhead Lines Association.

Mr. A. Lennox Stanton pointed out that no standards existed for power lines such as had been generally accepted in Great Britain for telegraphs, telephones, and traction.

The O.L.A. had issued a questionnaire (O.L.A. 77) in September, 1928, which aimed at securing extensive and detailed data, in accordance with one of the declared objects of the Association. He believed that the present regulations would not be too stringent if there were greater uniformity in design. There had been a poor response to the questionnaire, whereas in America a much greater degree of co-operation was evident. If information on the lines sought were collected, the Association would have a very much stronger case to put before the Commissioners. He seconded a resolution moved by Mr. Theodore Stevens that the President should select a committee to collect information upon which standards could be based.

Mr. W. Fennell (chairman) objected to any hasty steps towards rigid standardisation in overhead construction. The Association could not standardise high voltage lines until it was satisfied with the regulations governing their construction. He agreed that for low-voltage lines details of construction might well be standardised.

Mr. V. C. Manley suggested standardisation for low voltage, 11 kV, and 33 kV, and for three types of pole, *viz.*, wood, concrete, and lattice steel. They could not expect to get down to costs of from £150 to £250 per mile while so many designs were used.

Major Theodore Rich advocated standardisation in details such as bolts, nuts and brackets. The V.D.E. had materially reduced the number of conductors in use in Germany and had so lessened the cost.

Mr. Theodoré Stevens (president) said that it would be impossible to obtain modifications of the regulations from the Electricity Commissioners unless a satisfactory standard design could be produced which would justify such modifications.

Mr. G. C. Cockbain thought it was impossible to standardise many things, but, in such details as insulator iron work the number of designs might well be reduced. The main difficulty was to ensure that all tenderers quoted on the same lines.

Mr. W. Turner said that the new British Standard Specification for porcelain insulators was issued in 1930. Since then a considerable length of 11 kV distribution lines had been erected, but not in one single instance had an inquiry been made for insulators in accordance with the B.S.S.

Mr. H. W. Grimmett said that about 450 supply authorities had erected overhead lines, and all of these (including the ten power companies responsible for the electrification of 80 per cent. of the countryside) would not scrap their present designs for an O.L.A. standard.

Decorative Lighting

"Decorative Illumination" and "Illuminated Decoration" were the subjects dealt with in the two lectures delivered before the Edinburgh Architectural Association on February 17th. The speakers were Mr. E. H. Penwarden, and Mr. R. O. Ackerley, respectively, of the fittings design and illuminating engineering departments of the General Electric Co., Ltd. The papers were suitably illustrated with lantern slides, and effective demonstrations of various applications of colour lighting and floodlighting were given. Mr. Ackerley pleaded for greater co-operation between the architectural and decorative professions and the illuminating engineer in the case of new buildings, and particularly stressed the importance of calling in the lighting expert for consultation before the building had reached such a stage that alterations could not be embodied to meet the needs of good lighting.

Photo-telegraphy

At the last meeting of the Television Society, Mr. E. S. Ritter, of the G.P.O., spoke of some of the difficulties encountered in transmitting pictures over telephone circuits. He discussed also carrier-current and radio-circuit characteristics and the standard dimensions and speeds of rotation of the picture drum as laid down by the C.C.I.T. at Berne in 1931.

The Faraday Lecture

Prof. J. K. Catterson-Smith has commenced to deliver the Faraday Lecture at the various provincial centres of the Institution of Electrical Engineers. With the aid of an epidiascope he is giving some interesting screen demonstrations of everyday uses of electricity, and is showing that students have an immense piece of work before them, namely, to discover how to produce light electrically with reasonable efficiency.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

These Discounts

I would like to thank both "Real Fair Play" and "Vanadis" for their candid criticisms of my letter, and I must say that I felt sorely tempted to "let sleeping dogs lie" but I feel that in justification to my firm and myself I must attempt some retaliation.

On reading "Real Fair Play's" letter, I must confess that at first I had an inspiration that it would be to our advantage to dismiss all the salesmen in our employ and let the contractor do all our selling, but on second thoughts it occurred to me that although we would certainly save a considerable sum in overhead charges the contractors might possibly not keep up our sales to a figure which would cover the small percentage of our overheads which is not absorbed by our sales organisation.

The figures which are given by "Vanadis" are possibly explained by the general tendency on the part of machine makers to use built-in types of motors.

Although I am not very familiar with the working of the E.L.M.A. which "Real Fair Play" quotes as an example of "how it should be done," I am of the opinion that even *he* would experience some little difficulty in selling lamps to a user who buys, say, 30,000 per annum, although the said user may not be even remotely connected with the electrical trade.

Neither in my previous letter nor in this one have I attempted to justify the motor manufacturer who sells to all and sundry at trade discounts. My firm holds a leading position in the industry and we give a preferential discount of ten per cent. to all genuine traders who make or influence a sale on our behalf, but we give no form of charity to "discount snatchers."

As a matter of interest I give below an extract from the confidential instructions to our salesmen. The instructions ensure that discounts shall only be quoted to the following:—

> "All firms who describe themselves on their letter-heading as: engineers, supply companies, electrical engineers, electrical contractors, electrical wholesalers, consulting engineers, firms who buy motors with the definite object of reselling them, all firms who may not be in the engineering industry but who maintain their own engineering staff."

FAIR PLAY

February 15th, 1932.

High-voltage Railway Electrification

On page 194 of your issue of February 5th you quote from Mr. C. S. Whiteley's I.E.E. Students' Section paper the following:—

"Since by doubling the pressure on the line it is possible to reduce either the cross sectional area of the contact wires or the number of sub-stations to the fourth part . . . ."

I would point out that this statement can hardly be considered correct, as, although there are many complications which enter into the mathematical calculations of the voltage drop in connection with the overhead line of a railway system, the closest practical approximation is as follows:—

For a given loading per mile of line, doubling the voltage will result in sub-stations being spaced approximately twice as far apart on the assumption that the overhead line remains the same. If, on the other hand, the sub-stations remain the same distance apart, the copper section in the overload line can be reduced to approximately half.

Birmingham. E. H. CROFT.

February 18th, 1932.

The "Earth" Fallacy

One of the strange things in this much regulated land is the pride of place claimed by the electrical industry for its prolific crop of rules and legislation complete with an army of overbearing, half-informed officials growing fat on the annoyance they cause to the man who dares to use electricity. You may blow yourself up, or get asphyxiated with coal gas, you may generate carbon-monoxide in a variety of unexpected ways, get a collection of innocent poisons from your grocer, or scald yourself to death from your domestic boiler, and no one will interfere, but before you try to use electricity for a foul deed, be sure you know all about "earthing," lest it be said that in the absence of an "earth" you cannot be decently buried.

For years the writer has suffered many things at the hands of factory inspectors, because the Home Office requires all portable tools to be earthed. One cannot expect a Government official to think of any possible alternative method of protection; he has heard that earthing gives protection, so whatever the mere user may think about it, it is so.

On making visits to four separate factories in one area, a factory inspector found that certain portable drills of British manufacture had been in use for periods varying from one to three years. In each and every case the drill was provided with an earth wire through a three-core flexible, one core being connected to the case of the machine, but the millwrights and others had found it so convenient to couple these dangerous tools up to the nearest lampholder, that they had actually ignored the earth wire, as, of course, there was no provision for an earth connection on the lampholder plugs.

The drills were withdrawn from service, but one employer, being, perhaps, more frightened than the others, had an insulation test made on his three-year-old drills to see what risks he had really run.

The results were most disappointing. Even when quite hot, none of the machines showed measurably less than infinity insulation on a 500-V megger test, so he then tried to break them down, but, as he only had 2,000 V a.c. available, he had to give this up also, and to this day he does not know whether those drills would have given shocks if he had kept them in use for another hundred years on a 200-V circuit.

Now what about all this dangerous electrical stuff that people are getting about their homes? Certain supply bodies are now prohibiting the use of any portable domestic apparatus on their mains without earth connections. The folly and stupidity of their action is probably most damaging in the case of vacuum cleaners. Most machines of this class are now double insulated (a British machine led the way in this practice eight years ago).

Such machines are frequently plugged into lampholders which, incidentally, are not earthed, even although suspended by flexible within hand reach. In many such cases, to prohibit the use of a vacuum cleaner without an earth wire is to prohibit its use altogether.

What a splendid thing it would be if the Home Office and supply undertaking staff could have a little practical instruction on the construction and use of the apparatus they regulate, not to mention the acquisition of some elementary ideas concerning the many ways in which protection from electric shock and fire can be given.

THE WORM THAT TURNED.

February 22nd, 1932.

Centralised Purchasing

Mr. C. R. Belling, in a very interesting advertisement in the January 22nd issue of the ELECTRICAL REVIEW, made the following observations:

> ". . . . It does seem to me that the future of the electrical industry will depend largely on the supply authorities and manufacturers working more closely together. Whether centralised buying by the electric supply manufacturers and cut-throat competition amongst manufacturers to secure such orders will eventually be to the real good of the whole trade is very very doubtful indeed."

Mr. Belling's point would appear to be that each section should work to the common good and then share the resulting weal or woe, instead of taking the short-sighted route to its own immediate benefit.

One is bound to respect Mr. Belling's views on the subject, and I agree that, up to a point, the pulling together of all the varying factors would offer very considerable advantages (we have an example of the value of unity offered us by our rivals). But, whereas the sections can meet on common ground in broad principles, they are bound to travel divergent or even opposing paths in their pursuit of business, as, for example, in the case of centralised purchasing.

What is gained by supply undertakings' centralised purchasing? The possibility of increased profits resulting from the sale of appliances so purchased may be put on one side, as the sale of current-consuming apparatus is merely a means to sell more electricity. Perhaps the answer is indicated in the results from a power companies' scheme.

1. An iron has been purchased at a price permitting of its resale at 7s. 6d., which price allows the normal discount to contractors. (*a*) That an iron at that price fills a popular demand is indicated by the sales achieved already. (*b*) A number of manufacturers have subsequently marketed irons to sell at or about 10s. 6d.—a step in the right direction.
2. The manufacturer of kettles supplied under the scheme has reduced list prices—another step in the right direction.
3. A specially designed 1-kW fire has been obtained to retail at under 10s., with provision for contractors' discounts.

The undertakings participating in this buying arrangement have very definite gains. Moreover, the contractors in their areas have been well protected and need have no fear of price-cutting competition; the value of the contractor to the supply authority is too well known to be voluntarily impaired. The consumer is receiving the benefit of cheaper apparatus. Possibly manufacturers fear that an extension of centralised purchasing might lead to the calling for tenders for a colossal quantity of any one appliance. In such an event representations of manufacturers would lead to sympathetic moderations—as, for example, a request to tender for quarterly, in place of annual, requirements.

The whole question is one for consideration by the proposed Commercial Association.

BETA.

February 18th, 1932.

Parliamentary Notes

BY OUR SPECIAL REPORTER

Empire Broadcasting

On February 15th the Postmaster-General informed Captain P. Macdonald that the construction of a new station for Empire broadcasting was in hand, and that the British Broadcasting Corporation hoped to be able to provide a regular service before the end of the year. The scheme was being financed entirely out of the Corporation's revenue, and no question of overseas contributions would be raised until the new service had been established.

The Teleprinter

Answering questions by Mr. Hanley, Sir K. Wood said it was hoped to provide a local teleprinter service in London within about three months' time, and to extend it to the provinces and to include trunk service by stages during the course of this summer. The rental to be charged would be £65 a year, and messages would be charged for in a similar manner to telephone calls.

Railway Electrification Report

On February 17th Mr. Hutchinson asked the Minister of Transport if he could now state what action it was intended to take in respect of the recommendations of the Weir Committee on Main-line Railway Electrification.

Mr. Pybus said he understood that the railway companies were conducting investigations into the problem of railway electrification in the light of the report.

Control Traffic Signals

On February 17th Mr. Everard asked the Minister of Transport if he would state whether the electric traffic control signals, which it was proposed to erect in Piccadilly, were to be of British manufacture.

Mr. Pybus said that he saw no reason why the highway authority concerned should have difficulty in obtaining the necessary apparatus from British manufacturers.

Mr. Everard asked whether in all cases of grants given to local authorities for the erection of traffic signals one of the stipulations made would be that the apparatus must be of British manufacture.

Mr. Pybus said that light signals now being erected were, he believed, almost universally of British manufacture, although it might prove necessary in isolated cases to experiment with devices not at present manufactured here.

Overhead Line Refusals

On February 18th, in reply to Major Carver, the Minister of Transport said that up to the present one application from the Central Electricity Board relating to an overhead line and five applications for wayleaves in connection with the grid schemes had been refused. The applications related respectively to an overhead line at Wanstead, Essex, and to wayleaves at Dagenham, Essex; Nuneham, Oxford; and Bolney, Crawley and Hollington in Sussex. Four cases were refused after local inquiries and consideration of all the circumstances, including representations that there would be undue interference with local amenities. The other two refusals were based on legal grounds.

Electrical Soil Heating

Sir Philip Dawson was informed by the Minister of Agriculture that experiments in the use of electricity for heating the soil in glasshouses had been in progress for some time at research stations aided by the Ministry, but it was not yet possible to draw definite conclusions as to the application of this method commercially in this country.

Imported Ignition Cables

On February 18th Mr. Morris asked the Secretary to the Treasury if he was aware that high-tension ignition cables for motor cars, which should be subject to a 33⅓ per cent. safeguarding duty, were now being imported free under the guise of cables for radio purposes.

Major Elliot said he was not aware that that was the case. If he could be given particulars of any such instances he would certainly have inquiries made.

Legal

Siemens & Halske v. Standard Telephones

The opening of this case was reported in our last issue. Mr. Justice Maugham concluded the hearing of the action on February 18th. The plaintiffs claimed a declaration that a letter dated June, 1921, written to them by Standard Telephones & Cables, Ltd., and the obligations under it remained in force till December, 1935, notwithstanding a determination in January, 1928, and alternatively plaintiffs sought a declaration that the said agreement had been wrongfully determined, an injunction and damages. The letter of June 1st, 1921, upon which the plaintiffs relied, was as follows:—

"The Western Electric Co. (defendant's predecessors) agrees that during the continuance of the agreement between the Western Co., and Siemens Co., dated June 1st, 1921, and for a period from June 1st, 1921, until December 31st, 1935, neither it nor its associated companies coming within the scope of that agreement shall undertake in Germany directly or indirectly any business in the field of telephone apparatus (as defined in the agreement), but the Western Co. has and retains the right to manufacture or have manufactured for it telephone apparatus in Germany, such telephone apparatus not to be sold for use or used in Germany, and the Siemens Co. will from time to time grant licences under its patents when requested in writing by the Western Co. so to do to enable the Western Co. to manufacture and have manufactured for it in Germany the same types of telephone apparatus as it or its associated companies may have the right to make elsewhere so far as such rights may be conferred by licence from the Siemens Co.

"Signed on behalf of the Western Electric Co., F. H. Wilkins."

It was alleged by the plaintiffs that the defendants, through the International Standard Electric Co., controlled a company in Germany, in which they acquired a controlling interest, and became a competitor of the plaintiffs in the business of telephone apparatus. This controlling interest, plaintiffs alleged, extended from May to September, 1929.

Sir Stafford Cripps, K.C., for the plaintiffs, stated that since September, 1929, it was alleged that the defendants had promoted a large combine in Germany to which they had contributed large sums of money and the whole of their patent rights. It was therefore alleged that the defendants were thus directly or indirectly carrying on business in Germany.

Mr. J. D. Greene, K.C., for defendants, contended that both the business agreement and the letter contract had terminated. He argued strongly against the submission that when the agreement had come to an end it was possible to come along and say that parts of it remained for plaintiffs' benefit. The restrictions had gone with the rest of the agreement and each party had full liberty to deal with its patents subject to this, that if either had granted to the other a licence that would remain.

His Lordship, in giving judgment, said that the agreement which arose in this case was contained in the contract letter itself, and provided generally for a peculiar kind of pooling or larger business by means of quotas and percentages in the different countries of the world. With regard to the letter contract the defendants admitted that they were bound by it if it was still in force. The parties worked satisfactorily under the agreement until 1928, when the defendants treated the breaches by the plaintiffs as a repudiation of the agreement and acted accordingly.

There had been an arbitration which had been determined in favour of the defendants. The business agreement was determined in 1928. He could not take the view that the contract letter stood notwithstanding the repudiation of the Siemens agreement by the plaintiffs. The contract letter was confined to the date when the pool was in existence. In his opinion the letter contract had ceased. He therefore dismissed the action, with costs.

Wrongful Use of "A.M.I.E.E."

In the Chancery Division on Friday, Mr. Justice Eve had before him a motion by the Institution of Electrical Engineers for a writ of attachment to issue against Mr. Thomas R. Shaw, of Northgate, Chester, for disobedience of an injunction restraining him from using the letters "A.M.I.E.E." in connection with his name.

Mr. W. Lloyd Jacobs, for the plaintiffs, said the order was made in 1928, when the defendant consented to a perpetual injunction.

Defendant appeared in person. He had filed an affidavit apologising to the Court and stating that the letters were used innocently and in ignorance that he was doing wrong. An assistant had sent out an estimate on old paper on which the letters appeared, and he had now destroyed all that paper.

His Lordship said that as the defendant had apologised to the Court, he would not be sent to prison, but he would have to pay the costs of the motion.

Wayleave Dispute Appeal

The Court of Appeal, consisting of the Master of the Rolls, and Lord Justices Slesser and Romer, heard an appeal by the plaintiffs in the recent wayleave actions brought by the West Midlands Joint Electricity Authority and the Ministry of Transport against Mr. W. J. Pitt and other landowners. The question at issue was whether the Minister of Transport in giving consent to the placing of electric lines was entitled to stipulate the amount of the payment to be made to the landowners concerned or whether the matter should go to arbitration, as the defendants maintained.

In the King's Bench Division Mr. Justice Macnaghten decided in favour of the defendants and against this judgment the Joint Authority and the Minister of Transport now appealed.

The Attorney-General, Sir Thomas Inskip, K.C., argued the case for the Minister, while Mr. Craig Henderson, K.C., appeared for the Joint Authority. The respondents were represented by Mr. Tyldesley Jones, K.C. At the conclusion of the arguments the Court reserved its judgment.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Smoothing Irons

A special feature of a range of "Sunco" smoothing irons recently introduced by the SUN ELECTRICAL CO., LTD., 118 and 120, Charing Cross Road, W.C.2, is a clip attached to the back of the handle stirrup for holding the spring guard of the connector in a vertical position, in which there is considerably less strain on the end of the flexible lead.

Clip on new "Sunco" iron

The flexible is also kept well away from the table on which the iron is being used. When the iron is in the rest position there is no strain on the connector. The bead-insulated element is housed in a groove in the base plate, and so arranged that the maximum heat is obtained at the toe. The thick sole plate is ground, polished and plated. A two-pin all-insulated connector fits snugly on to the pins, protected by the metal shroud on the cover plate.

The irons are available in nickel-plated and red- and blue-enamel finishes, and are supplied complete with the connector, two yards of "flex," and a "Bakelite" lampholder adaptor. Each weighs 4½ lb., is loaded at 350 W, and is supplied for standard voltages of 100-110, 200-210, 220-230, and 240-250.

A Ceiling Switch

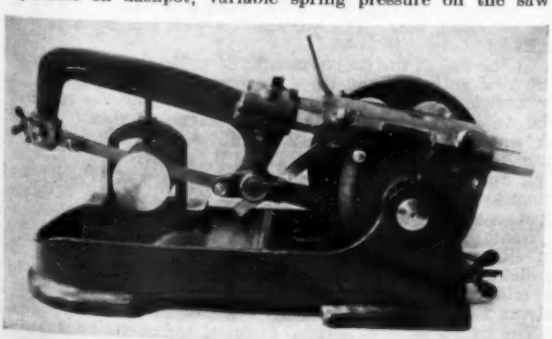
MESSRS. J. H. TUCKER & CO., LTD., King's Road, Tyseley, Birmingham, have recently introduced the "Sincord" (single cord) ceiling switch, the movement of which is that employed in the makers' standard "quick make and break" "B 4000" type 5-A tumbler switches. A special, yet simple, cam arrangement is embodied, which enables the switch to be operated in any position—vertical or horizontal—a valuable feature where it is desired to mount the switch on the wall.

"Sincord" ceiling switch

The switch is of substantial construction, and is ordinarily supplied with 7 ft. of operating cord which can, if desired, be detached and a hook fitted on. This renders the switch suitable for use in institutions, where it is desirable that the switches should only be operated by authorised persons. It is available with one- and two-way movements for surface and semi-recessed mounting with white or brown "Bakelite" covers and bases, or with metal covers in the usual range of finishes.

Bench Hacksawing Machine

The latest addition to the range of "Rapidor" hacksawing machines produced by MESSRS. EDWARD G. HERBERT, LTD., Atlas Works, Chapel Street, Levenshulme, Manchester, is the "Rapidor Minor," capacity 3 in. by 3 in., which can be bolted to the fitter's bench to save his time and energy in sawing up small stock by hand, or it can be supplied with a cast-iron base to provide a sturdy and high-production hacksawing machine for tool room use, or for the smallest repair shop or garage. The machine has two 45-ton steel V slide bars for rigid guidance and permanent alignment of the saw frame, automatic relief on the return stroke by means of adjustable oil dashpot, variable spring pressure on the saw blade, and a phosphor-bronze bearing. A model self-contained with motor drive is available, or for external driving the machine is fitted with a pulley 10 in. wide and 2¼ in. in diameter. The machine may be run at 200 r.p.m. An 8-in. hacksaw blade is used, fitted in special sawholders.



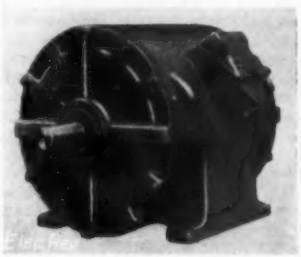
"Rapidor Minor" hack-sawing machine

The rate of cutting on mild steel bar is over one sq. in. per minute; on brass bars the rate of cutting is over 5 sq. in. per minute. The overall dimensions of the equipment are 2 ft. 2 in. by 1 ft. 1 in. by 1 ft.; the weight is about 90 lb.

New Frame-cooled Motors

The design of the "Witton" frame-cooled a.c. squirrel-cage motors embodies new features which make this type of machine specially suitable for installation in gas and chemical works, collieries, quarries, and similar situations.

The motor is built on the usual lines so far as the core and windings are concerned, but with a shell consisting of a double-wall casting, the annular space between the two walls being divided into sections by ribs to form ventilating ducts. The inside of the inner wall is bored out to hold the stator stampings. In the centre of the shell the greater part of the back of the stampings is exposed to the air flowing in the shell ducts, which are arranged to form two entirely separate circuits for air flow, adjacent ducts being in different circuits. The internal air circuit is formed by (*a*) a set of alternate ducts, (*b*) the axial ducts in the rotor core, or alternatively holes in the hub, and (*c*) the space at each end between the brackets and end winding. Air is blown round this internal circuit by a fan fitted at the driving end of the machine, and scrubs the exposed surfaces of the stator and rotor end windings, from which it absorbs heat. During its passage through the stator internal ducts, the air scrubs the ribs, which are kept cool by the air in the adjoining vent duct, which is in the external circuit.



G.E.C. frame-cooled motor

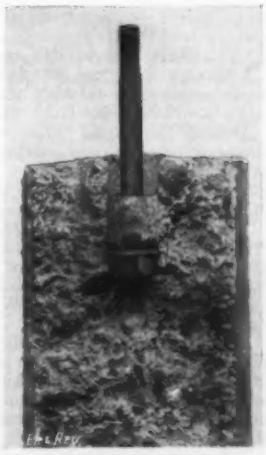
The external circuit consists of the external ducts through which cool air is forced by a second fan round the back of the core and the walls of the ducts, and is then exhausted through holes in the end-bracket. By keeping the core cool, a temperature gradient is maintained between the slot portion of the stator coil and the core, resulting in a flow of heat from the winding, which is thus maintained at permissible temperatures. By the use of this ventilation scheme in two circuits arrangement is made for cooling all parts of the motor.

The fans are fitted on the rotor in such a way as to leave both bearings accessible from the exterior. The exhaust openings for the external air can be cleaned out with a flue brush when necessary without disturbing any part of the motor. These motors are rated in accordance with B.S.S. 168-1926, and their temperature rise will not exceed 50 deg. C. after a continuous run on full load for six hours. They are capable of maintaining 50 per cent. overload in torque for one minute, and 100 per cent. for 15 seconds.

The motors are made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.

Foundation Bolt Anchor

The "Rawlplug" bolt anchor produced by the RAWLPLUG CO., LTD., Cromwell Road, S.W.7, has a cylindrical piece of lead surmounting a toothed chilled-iron anchor, the whole having a central hole to take the stem of the foundation bolt. The head of the bolt and the anchor are inserted in a suitable hole in the concrete or other material, which can be bored quickly by a special tool supplied by the company. Caulking spreads the anchor teeth and forces them into the foundation material, and also expands the lead section. The result is that the greater the pull exerted on the bolt, the more firmly the anchor embeds itself.



Foundation bolt secured

While it is desirable to fill in the upper section of the hole into which the bolt and anchor have been slipped, this can be done after the fixing has been completed. The anchor is suitable for practically any kind of foundation material, is unaffected by atmospheric conditions, and can also safely be fixed under water.

Germany's Electrical Exports

THE statistics of Germany's export trade in electrical machinery and electro-technical products which are printed below are of unusual interest. There is little doubt that in 1931 Germany made a strenuous effort to produce as large a favourable balance of trade as possible in order to meet her reparation and other obligations.

Despite these endeavours the result in the electrical group of trades was that, compared with 1930, her exports decreased by roughly 60,000 double centners in weight and 85 million marks in value, thus continuing the decline that took place between 1929 and 1930. It will be observed that the percentage decrease in weight was rather more than that in value, thus indicating a fall in prices. Deliveries in kind for reparations were in 1931 only about half their 1930 value.

In connection with the countries of destination of the principal lines of electrical manufacture, attention may well be directed to the wide range of distribution of wireless material. There is testimony to Germany's renewed enterprise also in the Argentine market. Perhaps, however, the most significant feature is the large volume of export to Soviet Russia. It seems fairly certain from recent reports from that troubled country that her purchases of electrical plant will now be considerably curtailed. If so, a great outlet for Germany will be severely restricted and therefore in order to maintain the level of her exports she will have to make most strenuous efforts in other markets.

Again, her sales in the French market are to be subject to a rigid quota. In short there is no prospect of diminished competition on the part of Germany in international trade.

The total exports of electrical machinery and parts fell from 382,750 double centner in 1930 to 320,586 in 1931, and electrotechnical exports from 1,235,200 to 1,129,410 double centner.

Reparation deliveries are included in the foregoing totals. In 1931 they amounted in value to 8,621,000 m., against 16,339,000 m. in 1930, in respect of electrical machinery; and 10,137,000 m., against 19,079,000 m., in respect of electrotechnical products.

The total imports of electrical machinery and apparatus showed a further decline. Machinery in 1931 was 20,310 double centner in weight and 6,704,000 m. in value, as compared with 30,277 double centner in weight and 9,200,000 m. in value in 1930, while electrotechnical products were in 1931 31,779 double centner in weight and 29,981,000 m. in value, as against 38,790 double centner in weight and 34,436,000 m. in value in 1930.

The following statistics showing the value (in thousands of marks), weight in double centner (equal 220 lb.) and in some instances the number of pieces, of electrical machinery and apparatus exported from Germany last year are based on the official foreign trade returns of that country. A column has been added showing the increase or decrease compared with 1930. Exports on reparation account are included.

	1931.	Inc. or Dec.
Lighting and starting apparatus for motor vehicles—		
Value	4,905	– 675
Weight (double centner)	7,672	+ 632
Number	80,965	– 6,035
Dynamos, motors convertors and transformers up to 5 double centner—		
Value	29,470	– 7,880
Number	785,550	+ 10,670
Weight (double centner)*	74,020	– 23,580
Dynamos, motors, convertors and transformers from 5 to 30 double centner—		
Value	16,620	– 4,070
Number	6,420	– 1,090
Weight (double centner)†	70,030	– 12,680
Dynamos, motors, convertors and transformers over 30 double centner—		
Value	27,745	– 6,065
Number	1,200	– 360
Weight (double centner)‡	144,180	– 26,380
Armatures and commutators—		
Value	9,880	– 290
Weight (double centner)	24,690	– 160
Accumulators, plates, &c.—		
Value	5,160	– 620
Weight (double centner)	41,220	+ 4,610
To Denmark	3,000	– 1,870
„ Holland	7,630	– 2,920
„ Sweden	14,580	+ 12,880
„ Argentina	2,130	+ 620
Cable—		
Value	41,310	– 14,060
Weight (double centner)	501,680	– 43,390
To Holland	148,260	– 17,270
„ Denmark	24,540	+ 19,190
„ Sweden	28,940	+ 7,440
„ Soviet Russia	16,090	+ 14,900
„ Argentina	80,970	– 24,540
„ Uruguay	20,780	+ 7,510
„ Great Britain	21,470	– 460
Measuring and recording instruments—		
Value	34,590	– 5,130
Weight (double centner)	25,030	– 3,850
To Holland	3,130	– 550
„ Great Britain	2,180	+ 20
„ Belgium	1,190	– 300
„ Italy	1,430	– 610
„ Sweden	1,810	– 130
„ Argentina	1,170	– 520
Electric irons—		
Value	1,640	– 220
Heating and cooking apparatus—		
Value	11,500	+ 430
Metal filament lamps—		
Value	21,610	– 13,290
Hundreds	603,840	– 214,480
To Belgium	24,750	+ 4,300
„ Denmark	39,570	– 660
„ Poland	13,400	– 13,700
„ France	75,850	– 20,780
„ Great Britain	69,100	– 18,100
„ Italy	40,180	– 29,660
„ Holland	23,520	– 950
„ Austria	23,200	– 11,130
„ Sweden	29,360	– 20,860
„ Switzerland	21,700	+ 790
„ Czechoslovakia	37,090	– 1,410
„ China	25,510	– 28,800
Telephone material—		
Value	32,360	– 3,410
Weight (double centner)	20,640	– 3,810
To Belgium	990	– 530
„ France	940	– 350
„ Italy	3,770	– 2,400
„ Holland	3,230	– 340
„ Austria	1,460	– 1,070
„ Sweden	900	+ 510
Wireless material—		
Value	78,220	+ 20
Weight (double centner)	81,030	+ 6,260
To Belgium	4,760	+ 2,000
„ Denmark	3,060	– 1,140
„ Poland	1,080	– 40
„ Fin'and	1 430	– 120
„ France	6,480	+ 3,080
„ Great Britain	25,190	+ 4,890
„ Italy	1,390	– 1,300
„ Holland	6,570	– 3,100
„ Norway	1,810	+ 90
„ Sweden	6,240	+ 1,680
„ Switzerland	5,190	+ 1,190
„ Czechoslovakia	3,180	+ 25
Ignition apparatus, &c., and parts (excl. magnetos), and elec. accessories for motor vehicles—		
Value	16,350	– 6,690
Weight (double centner)	18,010	– 5,510
To Denmark	1,410	– 290
„ France	1,700	– 640
„ Great Britain	1,460	– 390
„ Italy	1,680	– 50
Safety and signalling apparatus—		
Value	8,190	– 1,760
Weight (double centner)	11,670	– 1,200
To Great Britain	3,570	+ 360
„ Holland	1,550	+ 170
„ Switzerland	1,300	+ 760
Apparatus for lighting, power transmission, electrolysis resistances, &c.—		
Value	109,200	– 12,960
Weight (double centn	276,320	– 73,260
To Great Britain	20,940	+ 670
„ France	18,870	– 4,100
„ Holland	34,070	– 5,100
„ Soviet Russia	34,160	+ 13,000
Galvanic batteries and parts and heating elements—		
Value	9,420	—
Weight (double centner)	54,070	—
To Great Britain	27,220	—
„ Sweden	6,490	—
„ India	5,220	—
Telegraph or telephone insulators—		
Value	5,630	– 1,020
Weight (double centner)	56,700	– 12,610
Electro-medical and dental app.—		
Value	16,710	– 3,000
Insulating material of asbestos, mica and micanite—		
Value	440	– 220
Weight (double centner)	410	– 240
Carbon and brushes, microcarbons, &c.—		
Value	1,910	– 170
Weight (double centner)	853	– 70
Arc lamp carbons—		
Value	2,570	– 40
Weight (double centner)	6,860	– 620
Electrodes—		
Value	9,390	– 1,280
Weight (double centner)	196,910	– 43,500

Principal countries of destination in 1930 (figures in double centner = 100 kg.).

* Soviet Russia, 7,766; Belgium, 4,230; United Kingdom, 2,650; Holland, 5,720; Argentina, 4,255.

† Soviet Russia, 22,950; France, 7,100; Holland 5,080.

‡ Soviet Russia, 47,256; France, 32,200; Spain, 9,610; Argentina, 9,100.

Tramways and Trolley Buses

STATISTICS of capital expenditure, operating costs, &c., (during the year 1930 for companies and for 1930-31 for local authorities) relating to tramways and railless vehicles have been issued by H.M. Stationery Office at 2s. 6d.

During the period under review there were 204 tramway undertakings in Great Britain (compared with 217 in 1929-30), of which 154 were owned by local authorities and 50 by companies; 175 were open for traffic at the end of the period, and 16 were not operated during the period.

The net capital liability was £36.86 million for local authorities and £18.99 million for companies—a slight reduction in the aggregate. Increased fares under temporary Orders operated for 23 undertakings. Combined gross receipts were £25,281,531 (£1.49 million reduction). Working expenses were £20,467,129 (£0.69 million reduction).

Local authority undertakings received £192,933 from the rates and relieved the rates to the extent of £261,259. Of the 154 local authority undertakings, 144 earned income, but four were unable to meet working expenses, six to meet interest charges, and 27 to meet capital redemption in full. These figures include income from petrol and trolley buses.

The mileage open for traffic at the end of the period was 1,702 by local authorities and 462 by companies, a total reduction of 160 miles. There are still 8¼ miles of steam-operated and 7¾ miles of cable-operated lines. The number of passenger journeys was 4,395 million, a decrease of 4.75 per cent. Car-miles run were 383 million, a decrease of 2.75 per cent.

Electricity consumed amounted to 845,846,112 kWh, an increase of slightly over 3,000,000 kWh. The consumption per car-mile averaged 2.21 kWh, compared with 2.14 kWh in the preceding year. The average fare paid was 1.36d. (1.37 in 1929-30).

At the end of the twelve months 24 trolley bus undertakings (21 local authority and three company) were open for traffic. In addition 24 local authorities and three companies possessed the necessary powers but had not exercised them. Capital expenditure amounted to £2.28 million, as against £1.97 in 1929-30. Gross receipts were £918,425 (an increase of £130,000 over the previous year), and working expenses £691,497 (an increase of £110,000). The operating ratio was thus 75.29 per cent. compared with 80.96 for tramways.

Route miles open for traffic were extended to 194 from 169 in 1929-30. Passengers carried increased in number by 26 million to 153 million, and car miles run by 2.4 million to 16 million. About 27 million kWh was consumed by the buses, giving 1.68 kWh per car-mile.

The return includes detailed financial and operating statistics for each undertaking and a list of Acts and Orders in force.

The Wholesalers' Dinner

THE annual dinner of the Electrical Wholesalers' Federation was held on February 18th at the Savoy Hotel, Councillor G. Harold White (president) taking the chair.

Col. Sir Joseph Nall, who proposed "The Electrical Wholesalers' Federation," said that the Federation was essentially a *bona fide* Federation, because it did not go out into the highways and by-ways for members, but included only those who were qualified for membership.

Rapid progress had been made in electrical distribution in post-war years, but its continuance during the next few years depended not only upon the distributing authorities, but also upon the traders who were able to show the consumer how best to use the supply when he got it. There was a small margin between electric power and its alternatives and the consumer must be able to get his supply at a reasonable price. He hoped that the industry would be spared any further interfering legislation.

Councillor White, in responding, paid a tribute to Sir Joseph, whom he said had proved a good friend to the electrical industry when the Electricity Bill was before Parliament. Those present were representative of all branches of the industry and there was room for all branches so long as they were efficient. There had been mention in the lay Press of electricity at 1d. per kWh. Such talk was ridiculous, except, of course, in the case of bulk supplies. The Federation now consisted of five sections, *viz.*, Scotland, London, Birmingham and South Wales, the North-East Coast, and Lancashire and Yorkshire.

The health of the guests was proposed by Mr. A. Albrecht (director) who said that the wholesaler was passing through difficult times. He welcomed Mr. Ll. B. Atkinson (deputising for Mr. A. E. Tanner, chairman of the C.M.A.), and said that he represented a body with whom they had intimate connections and with whom they did a large and increasing amount of business. The presence of Mr. Lingard also reminded him that he was pleased to see the change in the relationship between the Federation and E.L.M.A.

He referred to Mr. Rawlings as the father of the E.C.A. who had seen a tremendous change take place in the industry. If Mr. Rawlings were asked what was the outstanding feature he thought he would say that the time was past when they met across the table hoping they would get the best of one another. He recommended to the attention of all those present Mr. Rawlings's article on "A Confession of Faith" (ELEC. REV., October 16th, 1931), and read the following extract from this article:—

"Every human element in the electrical scheme of things which sets a personal, and therefore monetary, interest in the forefront of its programme, rather than the true and central interest of the industry as a whole, thereby betrays the great cause to which it is pledged."

An industry, however old or young, which could express that sentiment had nothing wrong with it.

In the prosperity of the whole industry lay the prosperity of the individual. Regarding electrical development, distribution was provided for by the Minister of Transport and it was no longer a question of distribution but of loading the mains. Only by allowing the factors to prosper could that be achieved. He welcomed Mr. Purse, who was on Committee D, which included all branches of the industry and to which they looked for prosperity in the near future. He advised all present to turn their backs on depression and look ahead to the prosperity which was on the way.

Mr. H. A. Lingard responded, and Ald. W. Walker, who supported him, said that there was one feature of the Central Electricity Board that must react favourably to the Federation; it was standardisation of supply. When the attention of the industry was turned to the domestic load it was one of the finest things that could have happened as the loss in the industrial load had been made good in this way. He had always recognised the wholesalers as one of the essential parts of the industry.

Mr. J. W. Dodds proposed "Our President" and Councillor White responded.

At the A.S.E.E. Dinner (*see p.* 310):—**Left to right: Messrs. A. C. Cramb and S. B. Donkin, Sir Cyril Kirkpatrick, Messrs. G. Scott Ram, J. M. Kennedy and A. M. Sillar, Sir William Noble, Mr. W. E. Highfield and Dr. J. C. Bridge**

British Overseas Electrical Trade in January

BELOW appears our usual monthly table of electrical imports and exports. It should be noted that the classification has been altered slightly and that a new heading "Other lighting apparatus" has been introduced.

An analysis of electrical machinery exports shows that there was a decrease of £157,900 as compared with January last year, goods exported to Canada (£15,489 against £10,537) being the only item showing any advance. Shipments to "other countries" fell from £112,896 to £35,638, while South American countries and New Zealand, purchasing £35,896 and £17,357 less respectively, were responsible for a substantial portion of the total decrease.

Compared with December last electrical machinery exports were £40,423 lower, the most outstanding decreases being with regard to European countries (£23,189 decrease), British India (£19,805 decrease) and "other countries" (£18,149 decrease). South American countries and Australia increased their purchases by £11,851 and £10,276 respectively.

	EXPORTS.			IMPORTS.			RE-EXPORTS.		
	Electrical Exports for Jan., 1932.	Inc. or dec. as compared with Dec., 1931.	Inc. or dec. as compared with Jan., 1931.	Electrical Imports for Jan., 1932.	Inc. or dec. as compared with Dec., 1931.	Inc. or dec. as compared with Jan., 1931.	Electrical Re-exports for Jan., 1932.	Inc. or dec. as compared with Dec., 1931.	Inc. or dec. as compared with Jan., 1931.
Insulated wires and cables	£101,903	+£15,110	—£68,064	£39,453	—£18,876	—£21,499	£60	—£275	—£6,932
Electric carbons	835	— 4,467	+ 191	12,434	— 14,281	+ 2,985	139	— 186	— 78
Arc lamps and searchlights	1,378	— 472	+ 673	193	— 2,721	— 436	100	+ 94	+ 1
Incandescent lamps	28,496	+ 3,589	— 12,197	7,997	— 26,396	— 25,045	712	— 143	— 71
Other lighting apparatus	28,395	+ 28,395*	— 9,226	15,903	+ 15,903*	— 22,561	1,212	+ 1,212*	+ 157
Batteries and accumulators	55,849	+ 8,434	— 7,048	15,935	— 11,083	— 29,578	331	— 148	+ 83
Meters and instruments	18,391	— 5,283	— 14,481	36,396	+ 6,865	— 2,064	359	— 370	— 962
Unenumerated goods and apparatus	77,637	— 56,254	— 91,163	53,079	— 83,912	— 28,137	4,390	— 584	— 2,509
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cables (not submarine)	11,959	— 518	— 60,711	714	— 674	— 2,303	74	+ 6	+ 8
Submarine telegraph and telephone cables	554	— 12,849	— 36,931	—	—	—	—	—	— 250
Telegraph and telephone apparatus	117,917	— 19,283	— 82,559	59,053	— 46,742	— 68,237	4,398	— 1,398	— 2,715
Electrical Machinery—									
Railway and tramway motors	1,053	— 2,487	— 16,605	—	—	—	—	—	—
Other motors and generators	59,046	— 74,973	— 78,781	—	—	—	—	—	—
Unenumerated electrical machinery	206,291	+ 37,037	— 62,514	87,431	— 52,308	— 34,077	7,903	+ 589	— 9,484
Total	£709,704	—£84,021	—£539,416	£328,588	—£234,225	—£230,952	£19,678	—£1,203	— £22,752

* Not separately classified in December, 1931.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Dundee to Buy British Cable

The Dundee Corporation Electricity Committee on February 15th unanimously decided to purchase British cable in preference to foreign. The offer of the Liverpool Electric Cable Co. for British cables was £3,569 for the supply required, which was eight per cent. higher than a foreign tender.

The Duke of York Visits Siemens's Works

The Duke of York paid a visit to the Woolwich works of Siemens Bros. & Co., Ltd., on February 19th, being received by Dr. H. R. Wright, the managing director, and members of the staff. After paying a visit to the ambulance rooms, the party toured the cable-making shops, where a feature of special interest was a new submarine telephone cable, now in course of manufacture, which is to be laid by the company's cable steamer *Faraday* in the autumn between England and Belgium. A visit was paid to the main turning machine shops, and from there the party toured the shop in which "Neophone" telephones are assembled. The Duke was introduced to a number of employés who had served more than fifty years with the company, and finally inspected the canteens. The accompanying illustration shows the Duke, escorted by Dr. Wright, arriving at the works.

The Duke of York at Siemens's works

Important Vacuum Cleaner Transaction

It is officially announced that the Eureka Vacuum Cleaner Co., of America, has sold its entire business in Great Britain and the British Empire to Messrs. A. Reyrolle & Co., Ltd. As a result the "Eureka" cleaner, which has been on the British market for over twenty-one years, will in future be made entirely in England of all-British materials.

According to Mr. Inkerman Bailey, managing director of the Eureka Vacuum Cleaner Co., Ltd., which formerly acted as the British distributing agency for the American company, this deal is the direct result of the effective measures taken by the British Government to protect and develop British industries. Mr. Bailey states that the fifty per cent. tariff on foreign-made vacuum cleaners, the abandonment of the gold standard, and the "Buy British" campaign, made it increasingly difficult, if not impossible, to continue to import and sell high-class foreign-made cleaners in the British market.

The Eureka Vacuum Cleaner Co., Ltd., will continue to operate as distributors of the cleaners.

An Inquiry for Lampholders

A Danish firm has approached the Department of Overseas Trade with a view to obtaining supplies of screw type miniature lampholders. Firms wishing to offer goods of United Kingdom manufacture can obtain further details upon application to the Department, 35, Old Queen Street, S.W.1, quoting reference number G.X. 11189.

An All-electric House Project

Towards the end of 1930 we reported the formation of the All-Electric House Co., Ltd., whose principal object was "to design, build, equip and exhibit a house or houses fitted with electrical equipment and electric plant of all kinds." The house was to remain on exhibition for a time and then sold, when it would be decided whether to proceed with a second house or to wind up the company. We now learn that the house is expected to be completed and ready for opening by August. The members of the Birmingham Circle of the British Electrical Development Association, who are responsible for the scheme, are receiving the active support of the Birmingham Corporation, and it is expected that the house (which is at Edgbaston) will be a very strong advertisement for domestic electrification.

New "Kandem" Works in Operation

Messrs. Korting & Mathiesen Electrical, Ltd., have now started production at their new "Kandem" works at 10, Parsons Green, S.W.6. These new works, when completely equipped, will be in a position to manufacture lighting fittings and lanterns for street lighting, floodlighting and general interior lighting, specialities for photographic and film studios, and arc lamps for various industrial purposes.

Radio Sets on Approval

It has been agreed between the General Post Office and the wireless trade that a dealer may supply a set "on approval" for a period not exceeding fourteen days without covering it by a wireless licence. He must, however, keep a record (open to inspection if required) of the name and address of the prospective purchaser, with the dates of supply and of recovery or sale, as the case may be. As soon as a customer has agreed to purchase a set he must take out a licence unless he already has one.

Proposed New Coventry Showrooms

The Coventry City Council is considering the provision of new gas and electricity showrooms in Corporation Street at an estimated cost of £27,618, to be shared by the two undertakings.

International Samples Fair

An electrical section is being provided in connection with the third annual International Samples Fair which is to be held in Tripoli, North Africa, from March 8th to May 8th next.

Ericsson Employés' Hospital Fund

The thirty-second annual meeting of the Ericsson Employés' Hospital Fund was held on February 17th, Mr. Engblom presiding. Grants amounting to £456 were made, a sum of £200 being given to the Nottingham General Hospital. It was decided to appeal for support of the Bed No. 2 Fund.

A Bright Window

The accompanying illustration shows one of the windows of the Battersea Electricity Department's showrooms which has been dressed by Messrs. Falk, Stadelmann & Co., Ltd. It will be seen that the products consist almost entirely of heating appliances and lamp shades, and the dimensions of the window have permitted of a large and varied display of appliances.

A display at the Battersea showrooms

Wages in the Electricity Supply Industry

The Industrial Court has decided that the wages of all grades of electricity supply workers in Districts Nos. 2, 3, 4, 6, 9 and 13 shall be reduced by 2½ per cent., provided that the reduction shall not operate so as to reduce the rates of wages of any workman by more than ½d. an hour or below 11½d. an hour. The reduction will not apply to workmen rated at 11½d. an hour or under.

Wages in the Cable Making Industry

The Joint Industrial Council for the Electrical Cable Making Industry informs us that the cost of living figure for February 1st was 47 per cent. above the pre-War level and that this

figure will not involve any alteration in wages on the third pay-day in March.

Transport Workers' Wages

It is reported that the provisional agreement for a reduction of wages was ratified by the Joint Industrial Council for the Tramway Industry on February 18th.

At a meeting of the executives of the three railway trade unions on February 23rd it was decided to reject the proposals of the "Underground" group for a temporary reduction in the salaries and wages of employés of the London tubes and Underground railways.

The Birmingham Corporation Handbook

Of particular interest on account of the British Industries Fair now being held at Castle Bromwich is the handbook for 1932 just published by the Birmingham Corporation. In its 276 pages, besides a well-written history and description of the city itself, are contained detailed particulars of the principal industries and the manifold advantages offered for the establishment of new factories. There is an interesting chapter on the electricity undertaking, with some good photographs of the Hams Hall power station.

Employment During January

The *Ministry of Labour Gazette* states that employment in the engineering industry in January remained bad. In the electrical engineering section employment, though very slack, was considerably better than in the other sections. The total number of unemployed in the engineering industry as a whole increased from 261,329 to 272,614, and the proportion from 26.0 to 27.1 per cent. In the electrical engineering section the number rose from 13,963 to 16,291, and the percentage from 15.1 to 17.6. There were also increases in the cable, wire and lamp manufacturing group, from 13,358 to 15,344 (12.3 to 14.2 per cent.), and in the electrical wiring and contracting industry, from 3,388 to 3,810 (15.1 to 17.0 per cent.).

A "Buy British" Exhibition

There is an excellent show of electrical apparatus in the "Buy British" Exhibition that is now being held in the Bootle Town Hall. The General Electric Co., Ltd., has a full range of household appliances, and Berry's Electric (1928), Ltd., are showing ironclad switch and fuse gear, electric fires, water heaters, &c. Hoovers, Ltd., are exhibiting vacuum cleaners. Another noteworthy stand is that of the Liverpool Corporation Electricity Supply Department, which is set out for demonstrations of various types of electrical apparatus.

The Exhibition was opened by the Mayor, Councillor A. Hankey, who is a member of the Strowger Works organisation

Inspecting "Xcel" appliances at the Bootle Exhibition

of the Automatic Electric Co., Ltd. The accompanying illustration shows the Mayor and Mayoress on the stand of the Automatic Electric Co., Ltd., inspecting the company's "Xcel" domestic appliances.

Association of Ex-Siemens Men

A smoking concert of this Association is to be held at Gatti's Restaurant, King William Street, W.C.2, on March 11th. Tickets are 3s. each, and guests will be welcome. Mr. J. Snow Huddleston, Dagenham Dock, Essex, the hon. secretary, will be pleased to send particulars of the Association to anyone qualified for membership.

Franco-Swedish Telephone Co-operation

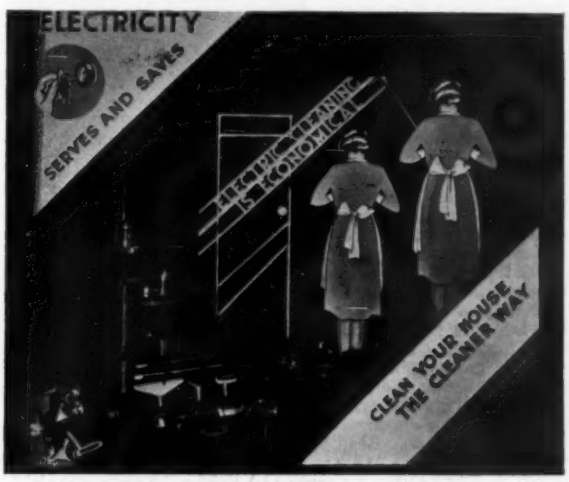
It is announced from Stockholm, that an agreement for intimate co-operation has been entered into between the Société de Téléphone Ericsson, the French subsidiary of the Swedish Ericsson Company, and the French telephone works, the Etablissements Grammont. No acquisition or interchange of shares is taking place.

The Batti-Wallahs' Society

The chief guest at the luncheon of the Batti-Wallahs' Society, which was held at the Hotel Metropole, on Friday last, was Sir Ernest Benn, who gave an address on "Public Economy." He stated that there was a danger of the standardisation of public expenditure. Year by year we took huge slices of capital, spent it as income, and so reduced our material wealth. The responsibility was with us, and there was need for a more serious tackling of the question of economy.

The E.D.A. Programme for March

The principal feature of the British Electrical Development Association's March programme is a scheme for illuminating poster hoardings, and illustrations are given of installations in Belfast, Poplar, and in the North Metropolitan Electric Power Supply Co.'s area. Attention is again directed to the electric furnace campaign and a special supplement is issued containing specimens of local advertising displays dealing mainly with electric heating. The Association hopes to be



The E.D.A. March window display

able to give details of the electric cooker campaign in the April programme.

Spring cleaning is the subject both of the window display for the month (which we illustrate) and of the majority of the new publications, a price list of which is included. Loose-leaf cases for containing copies of E.D.A. publications are now obtainable and four new letterpress posters have been prepared.

Sales Conferences

The sales conferences for next month arranged by the E.D.A. are as follows:—

London, March 18th, "Electric Heating of Buildings," by Mr. R. Grierson; Northern Counties Area, March 3rd, at Newcastle-upon-Tyne, "Youth and the Industry," by Mr. A. Albrecht; and North Midland Area, March 2nd, at Leeds, "Electrical Development, with special reference to Domestic Electrification," by Mr. J. N. Waite.

Army Welding Courses

A party of over thirty students from the Army Vocational Training Centre, Aldershot, visited the East London works of Murex Welding Processes, Ltd., recently to witness demonstrations of electric-arc welding, and, in addition, the students attended lectures on elementary metallurgy and the fabrication of all-welded steel structural buildings. A course in welding was introduced at the Centre in 1927, and has proved very successful; there are now sixty students and three instructors.

Murex Welding Processes, Ltd., have recently completed a contract to install a transformer set for six welders, which, ments up to one d.c. and six a.c. electric-arc welding equipment up to one d.c. and six a.c. electric-arc welding plants. Since the formation of the Centre in April, 1927, some 208 men have completed a welding course, and 162 have obtained work in the welding trade.

Recent Contracts

Two contracts have recently been awarded to the English Electric Co., Ltd., for trolley-buses. The first, from Southend Corporation is for two double-deck vehicles, for which the electrical equipment will comprise an 80-h.p. motor with standard control equipment and rheostatic and air braking. An important feature of these vehicles is the low overall height; the height from the ground to the roof is 13 ft. 1 in. with 40 in. dia. front tyres and 38 in. dia. rear tyres. The bodies will have completely closed-in backs and will seat 48 passengers. The second contract is for 10 single-deck trolley-buses for the Notts & Derby Traction Company. They are to seat 32 passengers and the electrical equipment will comprise a 60-h.p. motor and standard control apparatus complete with rheostatic and vacuum braking equipment. "English Electric" wireless choke coils will be fitted in both types of vehicle. A number of orders for motor bus bodies have also been received.

The General Post Office has placed a further contract with Siemens Electric Lamps and Supplies, Ltd., for several thousands of special inspection lamps.

The Hart Accumulator Co., Ltd., has supplied a storage battery consisting of "LLRB.7" type cells, having a capacity of 198 Ah, for the emergency lighting at the Free Trade Hall, Manchester.

Falk, Stadelmann's Jubilee

Reference was made in our last issue to the fact that Messrs. Falk, Stadelmann & Co., Ltd., celebrate their jubilee this year. We are now able to publish the portrait of the chairman of the company, Mr. Max Falk, whose brother (Mr. Solomon Falk) founded the firm in 1882. In that year the firm's premises comprised two rooms in the City and the staff numbered four. To-day the company's premises have a floor space of over half a million sq. ft. and it and its subsidiaries employ over 2,500 people.

Mr. Max Falk, Chairman of Falk, Stadelmann & Co., Ltd.

Mr. Max Falk entered the business very shortly after its foundation (in 1883) and in the following year the late Mr. Victor Falk also joined and established the oil lamp section of the business in conjunction with Mr. A. R. McLelland, one of the present directors. Mr. L. Thurner, who is now managing director, joined the firm in 1886, first in connection with the gas supplies section and later, as the electrical industry grew, with that side of the business. The Farringdon Road premises, which now occupy an area of between seven and eight acres, were acquired in 1900. Although in the following years development was largely in the gas side of the business, the company kept pace with the commercial advance of the electrical industry, and side by side with the gas burner works now operates a factory for electrical switches and accessories. An entirely separate works at Birmingham, recently enlarged, specialises in the production of electric lighting fittings. In addition, gas, electric and oil heating and cooking apparatus are made on a large scale at the Rainhill (Lancs) works, which cover an area of seven acres. Important contracts, amounting in value to over £250,000, have recently been completed for the Central Electricity Board by one of the company's subsidiaries which specialises in overhead transmission lines.

For Sale

Coventry City has for disposal four Lancashire boilers.

Manchester Electricity Department invites tenders for the purchase and removal of a motor convertor.

The Union Cable Co., Ltd., offers for sale an 85-kVA motor, 50-kW transformer, boiler, etc.

Two Diesel generators are offered for sale by Messrs. C. A. Newton & Co.

(See our advertisement pages to-day.)

File and Rasp Prices

The File Manufacturers' Association informs us that its new selling list for files and rasps will come into operation on March 1st.

Social Events

The Igranic annual fancy dress carnival was held on February 12th, when some 450 employés and their friends spent an enjoyable evening in the Corn Exchange. A large proportion of the dancers were in fancy dress, and there was keen competition for the sixteen prizes, which were presented by Mrs. A. H. Curtis, who was accompanied by Mr. A. H. Curtis, general manager.

Mr. G. R. J. Parkinson, M.I.E.E. (chief engineer), took the chair at the annual dinner and concert of the sports and social club of the Midland Electric Corporation for Power Distribution, Ltd., held at the Town Hall, Wednesbury, on February 13th, when there was an attendance of over 150. Mr. Parkinson, who is president of the club, said that if every man pulled his weight, and optimism was maintained, he believed British industry could again achieve prosperity equal to that which followed the industrial depression of seventy-five years ago. He then handed awards to the captains of the various sports teams.

The annual dinner of the Bowling Club of the Electric Construction Co., Ltd., Bushbury, Wolverhampton, was held on February 13th, when Mr. J. Morey was in the chair and Mr. J. Manning, President of the Staffordshire Bowling Association, was a guest. The toast of the club was proposed by Mr. Morey, and responded to by Mr. A. W. Atkins.

Prices of Materials

Messrs. F. Smith & Co. report, February 24th: Electrolytic copper h.c. wire, 6¼d. 1-16d. inc. Silicium bronze wire, 8¼d., 1-16d. inc.

Messrs. Edward Till & Co. report, February 24th: India-rubber, Para fine, no change.

Messrs. James and Shakespeare report, February 24th: Copper bars (best selected), sheet and rod, no change. English pig lead, £16 5s., 15s. dec.

Swedish Radio Import Duties

The *Board of Trade Journal* announces an increase from 10 to 20 per cent. *ad valorem* in the Swedish import duties relating to radio receiving apparatus and parts (excluding valves).

Trade Announcements

Mr. Arthur Cozens, of Ascot, Sunningdale and Camberley, has opened offices at 66, Victoria Street, S.W.1 (telephone Victoria 6225), and asks for trade lists and illustrated catalogues.

Messrs. Baxter & Caunter, Ltd., have been appointed sole agents for London, South and South-Eastern counties, for the sale of "Blaizolite" projector lanterns, manufactured by Messrs. Norrington & Landon, Ltd., Manchester.

Mr. J. A. E. Burgess, electrical engineer and contractor, has opened premises at 128a, Seabank Road, Wallasey.

New Australian Companies

Among the companies recently registered in Sydney are:—The Western Suburbs Electrical Co., Ltd., Marrickville, with a capital of £5,000, manufacturers and dealers in electrical goods; and the Pollock Electrical Manufacturing Co., with a capital of £10,000, electrical engineers.

Czecho-Slovakian Import Prohibitions

The Government of Czecho-Slovakia has announced its intention to prohibit the importation, except under licence, of a comprehensive list of commodities. The regulations do not apply to consignments handed to a public transport company by January 25th. The goods prohibited include steam turbines, dynamos, and electric meters, electrical apparatus and electro-technical equipment.

A Well-equipped School

The Wirral County Secondary School is one of the most up-to-date establishments of its kind. It was erected at a cost of £100,000 by the Cheshire County Council education authorities, and is situated about 2½ miles from Birkenhead. The individual buildings for girls and boys are separate and distinct, although both are designed on the same lines. Each has its own cinema, gymnasium, dining hall and baths, in addition to special science and engineering rooms and the usual class rooms.

The electrical installation was carried out by the Economic Electric Co. (Liverpool), Ltd., of Oxton Road, Birkenhead, and consists of 1,000 lighting points—all of which are equipped

Gymnasium at the new Wirral school

with special fittings, 48 power plug points, several motors for driving lathes and woodwork machinery, and motor-driven heating apparatus. The switches throughout are of the sunk flush pattern, fitted in iron boxes. The contract involved the use of a total length of 27,000 yards of Henley v.i.r. cable of various sizes, drawn into heavy gauge screwed galvanised conduit.

New Catalogues and Lists

Leslie Dixon & Co., 218, Upper Thames Street, E.C.4.—A 74-page catalogue (No. 77) and sale list illustrating and describing a wide variety of "Electradix" electrical and radio apparatus and instruments.

Geo. Bray & Co., Ltd., Leeds.—An illustrated leaflet relating to "Chromalox" electric radiators and also a leaflet giving particulars of the construction and advantages of the company's high-speed boiling plates.

George Humphry, 25b, High Street, Wimbledon, S.W.19.—Prices and particulars of "Community Service" fuse wire holders.

Walter Grafton & Son, Ltd., Eltham, S.E.9.—A leaflet describing the "Localite" and "Zonalite" adjustable wall and table lighting fittings.

Donovan & Co., 47, Cornwall Street, Birmingham.—Publication No. 3211 relating to the company's type 61 theatre dimmer.

British Insulated Cables, Ltd., Prescot, Lancs.—Leaflets P.F. 87 and 88 dealing, respectively, with "Coraline" soldering paste and "Resinkor" solder.

William McGeoch & Co., Ltd., 46, Coventry Road, Birmingham.—A leaflet relating to "Warwick" ironclad switch and fuse gear.

Midland Electric Manufacturing Co., Ltd., Barford Street, Birmingham.—A pamphlet on "M.E.M." switch and fuse gear.

Electric Resistance Furnace Co., Ltd., 17, Victoria Street, S.W.1.—The February issue of the "Resistance Furnace" containing an article on "Electric Hardening of High-speed Steel."

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Descriptive leaflet No. 460/2-1, dealing with modifications introduced into the latest designs of central flow surface condensers.

Ferranti, Ltd., Hollinwood, Lancs.—Four illustrated lists (Nos. T100-3) on transformers.

Bankruptcy Proceedings

W. Sutcliffe, electrical contractor, 40a, Old Church Street, Oldham, Lancs.—The public examination was held at the Court House, Oldham, on February 16th, when a statement of affairs was submitted which disclosed gross liabilities of £133, of which £129 was expected to rank for dividend. The deficiency was estimated at £92. The examination was closed.

T. Sharpe, electrical contractor, 62, Oldham Road, Springhead, Yorkshire.—The public examination took place at the Court House, Oldham, on February 16th. The debtor had prepared a statement of affairs which showed liabilities of £869 and a deficiency of £864. He attributed his position to lack of capital, general trade depression, ill-health, and loss of £300 on a contract in 1929. The hearing was concluded.

S. L. Holt, electrical and radio engineer, 46, Highland Terrace, Uffculme, Devonshire.—The public examination was held on February 18th at the Castle, Exeter, when the debtor said that he had commenced business in 1928, under the style of Mitchell and Holt, without capital. He borrowed money, however, at interest from one of his creditors, and at first the business was successful. His statement of affairs showed a deficiency of £310. The failure was attributed to ill-health, bad debts, and excessive interest on a loan. The hearing was concluded.

J. Barber, wireless dealer, 38, Shoobridge Street, Leek.—First meeting February 26th at the Official Receiver's office, 12, Lonsdale Street, Stoke-on-Trent. Public examination March 15th at the Town Hall, Macclesfield.

W. Darbyshire, electrical factor and contractor, 65, Towngate, Leyland.—First meeting held February 25th. Public examination February 26th at the Sessions House, Lancaster Road, Preston.

W. P. Barnell, electrical engineer, 25a, Sheep Street, Northampton.—Discharge suspended for three months until April 11th.

E. M. Barker and H. D. Stillwell (Berks Electrical Co.), electrical and wireless engineers, 14, Cross Street, Reading.—Receiving order made February 12th on debtors' own petition.

E. A. Blest, radio dealer, 71a, Halesowen Road, Old Hill, Stafford.—Last day for receiving proofs for dividend March 7th. Trustee, Mr. A. M. Fairbairn, 1, Priory Street, Dudley.

R. E. Lomas (R. E. Lomas & Co.), electrical and radio engineer, 24, Tower Street, King's Lynn.—Last day for receiving proofs for dividend March 4th. Trustee, Mr. J. L. Wilkinson, 41, Sidney Street, Cambridge, Official Receiver.

Company Liquidations

City Electrical Appliances, Ltd.—Winding up voluntarily. Liquidator, Mr. O. Newton Holmes, Leicester.

Ennig Electric Light & Power Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Ashton, Crescent Chambers, Llandrindod Wells.

Private Arrangements

Contal Radio, Ltd., radio manufacturers and merchants, 33, New Inn Yard, E.C.2.—A meeting of creditors was held on February 17th at Winchester House. The representative of Messrs. Forestier & Co. was elected to the chair. The statement of affairs showed ranking liabilities of £3,006, due to unsecured creditors. After allowing £18 for preferential claims and £1,000 due on debenture, the net assets were £2,165. An offer was made of a composition of 5s. in the £, payable as to 2s. 6d. in cash and the balance by two instalments of 1s. 3d. each within six weeks and three months, respectively, the final payment being secured by a deposit with trustees of debentures for £500 in the company. The latter undertook not to increase the debenture issue until the final instalment was paid. After a short discussion it was decided that a committee of four of the principal creditors should be appointed to consider the matter and advise what offer should be accepted. The following are the principal creditors:—

	£		£
Robinson, Geo., & Sons, Ltd.	103	British Clarion Co., Ltd.	131
Telsen Electric Co., Ltd.	1,150	Lotus Radio, Ltd. ...	275
Kremner, L., Ltd. ...	146	Toubkin, J.	147
General Electric Co., Ltd.	125	Mullard Wireless Service Co., Ltd.	147
Dibben, W., & Sons, Ltd.	200	Subkin & Co.	641
		Tuper, Geo., & Co. ...	479
		Levy, H. H.	3,037

Dissolution of Partnership

Harrops Radio & Battery Service, 55-59, Bolton Road, Walkden.—Mr. W. A. Smith and Mr. S. Harrop have dissolved partnership. Mr. Harrop will attend to debts and carry on the business.

Winding-up Petition

Agricultural & General Engineers, Ltd.—A petition for the winding-up of this company has been presented to the High Court by Foster Turner, Ltd., and will be heard in London on February 29th.

Electricity Supply

Lighting, Domestic, Power

Ashton-under-Lyne.—CHANGE-OVER.—The Electricity Department has received sanction to a loan of £19,170 for change-over works in the west end of the town.

Australia.—TASMANIA.—The report of the Hydro-Electric Commission for the year ended June 30th last shows a total revenue from the hydro-electric undertaking of £343,896, which compares with £345,752 in the preceding year. This is the first time in the history of the undertaking that a decrease has been recorded. Operating expenditure increased from £61,218 to £63,281, and there was a net profit of £5,595 (£27,719). The general decline in manufacturing activities throughout the State was largely responsible for the fall in output, the cessation of work at Rosebery accounting for a large portion of the decrease. The Commission's new Shannon power station was officially opened on May 1st last.

Beckenham.—POWER FOR ELMERS END ESTATE.—In response to a request from the Elmers End Housing Estate for supplies of electricity for cooking, etc., the Urban District Council states that it will not proceed until a guarantee has been obtained from at least 100 tenants.

Bedford.—YEAR'S WORKING.—We have received from Mr. R. W. L. Phillips, borough electrical engineer, a copy of the accounts for the year ended March 31st last. The revenue increased from £122,483 to £145,728, while the working expenditure was £79,233, as compared with £69,796 in the previous year. There was a net profit of £6,956, as against a net deficit of £331. Capital expenditure during the year was £84,928, an increase of £1,802, the principal item being £38,963 for mains. The total sales of electricity increased from 26,658,177 to 36,377,413 kWh, and the maximum supply demanded from 9,250 to 13,880 kW. Bulk supplies advanced from 8,432,295 to 13,893,596 kWh.

Belmont (Durham).—STREET LIGHTING EXTENSIONS.—The Parish Council has granted permission to the Sherburn Parish Council to extend its electric street lighting system from Bay Horse, West Sherburn, to Sherburn House Station.

Bexhill-on-Sea.—NEW SUB-STATIONS.—The Electricity Committee recommends the provision of two Hewittic rectifier sub-stations (costing £6,900) to improve supplies in the Cooden and Downs districts.

Brighton.—EXTENSIONS.—The Electricity Committee is to provide a supply to the Mile Oak and Hangleton districts at a cost of £4,500. Mains extensions are also to be carried out to the Tarners Estate, at a cost of £1,050, and to the new fish market, &c., at a cost of £3,500.

Buckie.—PROSPECT OF REDUCED CHARGES.—The electricity undertaking has made such good progress during its first few months of operation that the Provost is optimistic of being able to reduce the charge for electricity next year from 8d. to 7d. per kWh. The monthly output has ranged from 10,000 to 15,000 kWh, with 230 private consumers, in addition to street and harbour lighting.

Continental.—RUSSIA.—During last year the capacity of the electric power stations in Russia was increased from 2,900,000 to 4,050,000 kW. Further developments are contemplated this year in the direction of completing certain hydro-electric works and of starting constructional work at new and similar stations, while at the same time twenty-six new thermal power stations are to be erected.

Eston.—STREET LIGHTING EXTENSIONS.—The Electricity Committee is to extend street lighting to the Grangetown Village Estate at a cost of £1,100.

Exeter.—WIRING SCHEME.—The Corporation Housing Committee is to have the 350 houses on the Burnthouse Estate wired for electricity, and an all-in tariff based on the rateable value of the premises is to be introduced.

Glasgow.—PROGRESS DURING JANUARY.—Under the Electricity Department's scheme 94 houses were wired in January, bringing the total to 35,172. The hired appliances installed totalled 20,616 at the end of the month.

MAINS EXTENSIONS.—The Electricity Committee recommends the extension of mains at a cost of £2,643.

Gravesend.—YEAR'S WORKING.—In his report on the operation of the Corporation electricity undertaking during the year ended March 31st last, Mr. C. F. McInnes, borough electrical engineer, states that the total revenue amounted to £33,612, an increase of £7,155 as compared with the preceding year, while the gross profit amounted to £39,496, an increase of £1,471. There was a net surplus of £10,053, as against £10,193 in 1929-30. Capital expenditure during the year amounted to £39,428, bringing the total invested in the undertaking to £504,560. Electricity sold increased from 16,342,040 to 17,737,612 kWh, and the maximum load from 6,100 to 7,000 kW. The average price obtained per kWh fell from 1.14d. to 1.13d. New consumers numbered 935, bringing the total at March 31st to 6,361.

Great Yarmouth.—LOAN.—The Town Council has applied for sanction to a loan of £2,500 for transformer plant required in connection with the grid supply.

COAL HANDLING PLANT.—The coal handling plant is to be extended at a cost of £1,282.

Greenock.—CHANGE-OVER.—The Corporation has received permission to alter the system and pressure of its supply from 500 and 250 V d.c. to 440 and 250 V a.c. 50 cycles.

Halifax.—NEW TURBO-ALTERNATOR STARTED UP.—A new 7,800-kW turbo-alternator was officially put into operation on February 15th by Mr. Samuel Thornton, vice-chairman of the Electricity Committee.

Isle of Man.—DOUGLAS.—The Town Council has applied to the Tynwald Court for permission to borrow £36,048 for a turbo-alternator and boiler plant at Pulrose, a motor alternator and transmitting plant at North Quay, with auxiliaries, switchgear and inter-connecting l.p. cables; and a sum of £14,000 for cookers, meters, services, l.p. mains, public lamps, and a transformer kiosk.

Lichfield.—REDUCTION IN SHOP-WINDOW CHARGES.—The City Council is to supply electricity for shopfronts and signs after 7 p.m. at 3d. per kWh.

MAINS EXTENSIONS.—Mains are to be extended in Wheel Lane and to Huddlesford.

LOAN.—A loan of £5,595 has been sanctioned for electrical development.

Liverpool.—A SUCCESSFUL YEAR.—The year now concluding has been a successful one for the Corporation Electricity Department, which by March 31st will probably have sold 295,000,000 kWh of electricity, an increase of about 15,000,000 kWh over the previous year's figure. The maximum demand has increased from 106,920 to 114,210 kWh, and the number of consumers who have availed themselves of the assisted wiring scheme has reached 2,000. The profit for the year is expected to be about £105,000, or £39,000 above the estimate. It is proposed to apply £30,000 for the relief of rates.

London.—CHARGES IN THE J.E.A.'S AREA.—The London and Home Counties Joint Electricity Authority has published a booklet setting out the charges made by electricity supply undertakings in the London and Home Counties Electricity District on January 1st, 1932. Besides lighting, power, heating, cooking and special charges, details are given of the hire of meters and minimum charges.

ST. PANCRAS.—The Electricity and Public Lighting Committee recommends that application be made to the Electricity Commissioners for permission to change over the system of supply in the borough gradually from d.c. to a.c. It is proposed to give an a.c. supply to the London Temperance Hospital extension in Hampstead Road, the new Crown Estate dwellings in Cumberland Market area, and other premises in the immediate vicinity, at an estimated cost of £11,064.

ISLINGTON.—Sanction to the borrowing of £94,000 for mains, services, transformers, and meters has been applied for by the Borough Council.

HACKNEY.—H.R.H. Prince George is to perform the opening ceremony at the new generating station extensions on June 23rd.

Application is to be made for sanction to loans of £15,000 for service lines and £27,000 for meters and demand indicators.

HAMMERSMITH.—The expenditure of a further £10,000 on the assisted wiring scheme is proposed by the Electricity Committee. It is suggested that the scheme should be amended so as to provide for a minimum of two and a maximum of twelve points (instead of four to sixteen).

The Electricity Committee recommends the hire of immersion heaters at 7s. 6d. per quarter.

BATTERSEA.—The Electricity Committee has obtained sanction to a loan of £45,000 for mains and services.

Lowestoft.—SUPPLY TO CARLTON COLVILLE.—The Town Council has received sanction to a loan of £860 (part of £1,850 applied for) for the provision of a supply of electricity to Carlton Colville. The balance is for overhead lines, for which the Ministry of Transport has now given its consent.

Newcastle-upon-Tyne.—STREET LIGHTING.—The City Council is to provide electric lighting on two new roads across the Ouseburn.

Newmarket.—REQUEST TO ELECTRICITY COMPANY.—The Urban District Council is to request the Bedfordshire, Cambridgeshire and Huntingdonshire Electricity Co. to make application for an Order extending its powers to supply electricity in Newmarket from 1940 to 1950. The company is reducing its lighting charge from 9d. to 8d. per kWh.

New Zealand.—RETRENCHMENT POLICY.—Further drastic cuts in expenditure, in which a number of public works and electrical schemes will suffer, are understood to be under consideration by the Government. Many major works under construction will be discontinued if the proposals come into effect, including the large railway deviation electrification scheme near the Wellington and Stratford branch of the main trunk railway. Work on the Waitaki hydro-electric scheme will be curtailed, it is believed, but the repairs at Arapuni will be continued.—*Reuter* (Wellington).

DUNEDIN.—Mr. C. Henderson, the city electrical engineer, states in his report for the year ended March 31st last that the revenue showed an increase from £218,450 to £223,886, while the operating costs rose from £61,971 to £77,808. The net profit decreased from £38,333 to £12,003. The total energy generated was 64,491,030 kWh, and the maximum load 14,845 kW, as compared with 14,341 kW in the previous year.

Nottingham.—CABLE EXTENSIONS.—The laying of ten miles of cable in the Apsley district is proposed by the Electricity Committee. The cables will eventually extend to Basford.

Portland.—SUPPLY TO BORSTALL.—The Electricity Committee is negotiating with the Prison Commissioners with regard to a supply to Borstall.

Rawtenstall.—NEW SLUICE WEIR.—The Corporation has applied for sanction to a loan of £2,500 to construct a new sluice weir at the electricity works.

Silksworth (Durham).—ANOTHER CANVASS.—The Houghton-le-Spring and District Electric Lighting Co., Ltd., has decided to take another canvass of the inhabitants of the village in order to ascertain the demand for electricity. A canvass was taken some weeks ago, when only ten inhabitants were in favour of a supply.

Swansea.—A FUEL PROPOSAL.—A proposal to use anthracite duff for boiler firing at the new generating station now in course of erection is being considered by the Corporation. About 1,000 tons would be required daily.

Ticehurst (Sussex).—ELECTRICITY FOR ROBERTSBRIDGE HOUSES.—The Rural District Council has decided to have electricity installed at Council houses at Robertsbridge at a cost of 30s. per point. Shilling-in-the-slot meters will be provided, and of every shilling, 2d. will go towards the cost of the installation.

Tonbridge.—SEWAGE PUMPING PLANT.—The Rural District Council has decided to install automatic electric pumping plant at the Hildenborough sewage works.

Tunbridge Wells.—SUPPLY TO PEMBURY INSTITUTION.—The Kent Public Assistance Committee has decided to enter into an agreement with the Corporation for a supply of electricity to the Pembury Poor Law Institution.

United States.—PROGRESS WITH HOOVER DAM.—Such good progress is being made with the construction of the Hoover Dam that it is probable that the work will be completed a year ahead of schedule.

Wallasey.—HIRE FACILITIES.—The Electricity Committee is to provide facilities for the hire of domestic wash boilers.

West Lancashire.—SUPPLY TO HALSALL.—As permission to use overhead lines has now been received from the Scarisbrick, Halsall and Downholland Estates the Rural District Council will very shortly be in a position to supply Halsall with electricity.

Whitburn.—ELECTRICITY FOR HOUSING SCHEMES.—The Town Council is to ask the Scottish Midlands Electricity Supply, Ltd., to provide electricity in connection with Corporation housing schemes.

Traction

Accrington.—BUSES REPLACE TRAMS.—Accrington will shortly abandon the last of its tram services, and has already commenced removing the track in Blackburn Road, this stretch being the last 100 yards of the Accrington-Baxenden route. Later the lines to Clayton-le-Moors will be taken up.

Argentina.—TROUBLE AT ROSARIO.—Owing, it is stated, to the failure of the municipal authorities to demand the withdrawal of competing bus services, as was agreed upon in October last, the Compagnie Générale des Tramways Electriques de Rosario suspended the operation of its tramway system in the town of Rosario on February 10th and is bringing an action against the municipal authorities for the cancellation of the concession and for the damages and interests to which it considers itself entitled as a result of the violation of its concession.

Continental.—SWITZERLAND.—The work of electrification having been completed, electric trains are now running over the whole length of the Bodensee-Toggenburg railway between Romanshorn, St. Gall, and Nesslau.

London.—PROPOSED TUBE EXTENSION TO HODDESDON.—According to *The Times*, proposals have been made to the Central London Railway by the Enfield Urban District Council for the building of a new underground railway from Liverpool Street to Hoddesdon, Herts. The idea has been under consideration by the urban councils of Edmonton, Tottenham, Hoddesdon, Ware, and others for some time, but these are the first proposals to be made in a concrete form.

New Zealand.—DUNEDIN.—The report of Mr. W. H. Mackenzie, tramway manager, states that for the year ended March 31st last the net revenue from the undertaking fell from £141,572 to £134,812. The working expenses declined from £92,143 to £91,699, and the net profit from £8,430 to £1,408. The number of passengers decreased from 21,107,122 to 19,416,033, and the car mileage from 1,696,652 to 1,629,980.

Southend-on-Sea.—TROLLEY 'BUSES.—The Town Council has decided to establish a new trolley-bus route at an estimated cost of £7,089.

United States.—RAILWAY ELECTRIFICATION.—The first section of the largest railway electrification scheme in America, comprising the 91 miles between Philadelphia and New York City, will be opened in a few months. The next section will be between Philadelphia and Washington, a distance of 135 miles. The system employed is single-phase overhead at 11,000 V.

The rolling stock ordered consists of 150 locomotives—ninety for passenger traffic and the remainder for freight. The passenger locomotives are capable of hauling trains at speeds up to 90 miles an hour. Each of the three driving axles is driven by twin commutator motors, a total of 3,750 h.p. per locomotive. With a 5,000-ton train the freight locomotives will be able to travel at 45 m.p.h. on the level when working three together. The motor unit consists of one-half of a twin passenger unit, but axle mounted.

Communications

Bulgaria.—INTERNATIONAL TELEPHONY.—With the conclusion of the Roumanian telephone improvements, by a line from Bucharest to Sofia, Bulgaria is now linked directly with Germany. On January 11th a service was opened between Germany and Sofia.

Canada.—WIRELESS SETS.—In the last three years the number of wireless receiving sets in use in Canada has more than doubled, and there is now a set for every four homes in the Dominion. According to a statement just issued by the radio branch of the Canadian Government Department of Marine, there were 548,342 licensed radio sets in use in the Dominion at the end of December. Among Canadian cities, Toronto has the largest number of licensed sets (75,240), Montreal coming second with 68,150, and Vancouver third with 27,574.—*Reuter's Trade Service* (Ottawa).

GOVERNMENT CONTROL.—The Prime Minister announced in the House of Commons on February 16th that a special committee would be appointed to consider the general question of broadcasting in Canada, whether it should be nationally operated or by some other appropriate medium. He said there was no doubt that the present system whereby numerous companies, mostly with advertising intent, used Canadian air channels, was unsatisfactory. A recent decision of the Judicial Committee of the Privy Council had decided that the Federal Government had control of the radio broadcasting regulations. The special committee would consider the recommendations of the Aird Commission report, which recommended the nationalisation of broadcasting.—*Reuter* (Ottawa).

Great Britain.—RADIO EXCHANGES.—Municipal authorities continue to receive applications for permission to establish radio broadcast relay exchanges. Eastbourne Highways Committee has the matter under consideration; Blyth Town Council has granted the Northern Wireless Relay Co. a five-year contract; Plymouth Works Committee has received 14 applications; Felling-on-Tyne has sanctioned the Northern Wireless Relay Co.'s service; Bootle Highways Committee is negotiating with Wireless Services, Ltd.; Stafford General Purposes Committee, after considering a number of applications, has entered into an agreement with Rediffusion, Ltd.; Rotherham Highways Committee is negotiating with Clear-Radio, Ltd.; Accrington Highways Committee is considering a number of applications; Worthing Corporation reports that during the last six months 415 new subscribers had been added to the existing service, making a total of 785; Newport (Mon.) has declined to allow Rediffusion, Ltd., to start a service; and Walsall Public Works Committee has decided not to sanction a service.

NEW RADIO STATION.—The B.B.C. announces that in connection with the rebuilding of the Daventry National and Midland Regional transmitters, it is considering various sites in the neighbourhood of Droitwich. A mobile transmitter is at present carrying out tests in order to determine the suitability of this area for the new station. No decision will be reached until exhaustive tests have been made and the B.B.C. has been able to estimate the results obtainable from the two transmitters erected on one of the sites under consideration.

India.—CARRIER-CURRENT TELEPHONY.—At present communication between Bombay and Calcutta is *via* Delhi, but it is hoped that a direct circuit now being installed by Standard Telephones & Cables, Ltd., in conjunction with the Department of Posts and Telegraphs will be in operation by the end of the financial year. The new circuit is of the high-frequency carrier type, with four repeater stations, and it will serve for both telephony and telegraphy. A parallel stand-by circuit is being provided, which will normally be used for intermediate service.

Italy.—ANOTHER HIGH-POWER STATION.—Following the success of the Trieste station, the recent opening of the Florence broadcasting station marks a further important advance in the reorganisation of the Italian broadcasting system undertaken by the E.I.A.R.—the Italian Broadcasting Company. The power of the new transmitter, which has been manufactured by the Marconi Company, is 20 kW and modulation can be effected up to 100 per cent. The stringent specifications laid down for the constancy of carrier waves of broadcasting stations have been conformed to by the use of an oscillating quartz crystal. Radio Florence is at present transmitting on a temporary aerial; the final aerial is to be of the quarter-wave "T" type suspended from two 100-metre self-supporting steel towers.

Poland.—AUTOMATIC TELEPHONY.—The Ministry has decided to convert the whole telephone network to the automatic system, which is to be accomplished with the aid of a £650,000 loan from England.

Rawtenstall.—RADIO AERIAL RENTALS.—The Corporation Housing Committee has considered the attachment of wireless equipment to council houses and decided that when the new rent books are printed a suitable clause shall be inserted in the conditions of tenancy providing that there shall be a payment of one shilling per annum by tenants for the privilege of attaching wireless equipment to the houses or of erecting poles in the gardens for such installations.

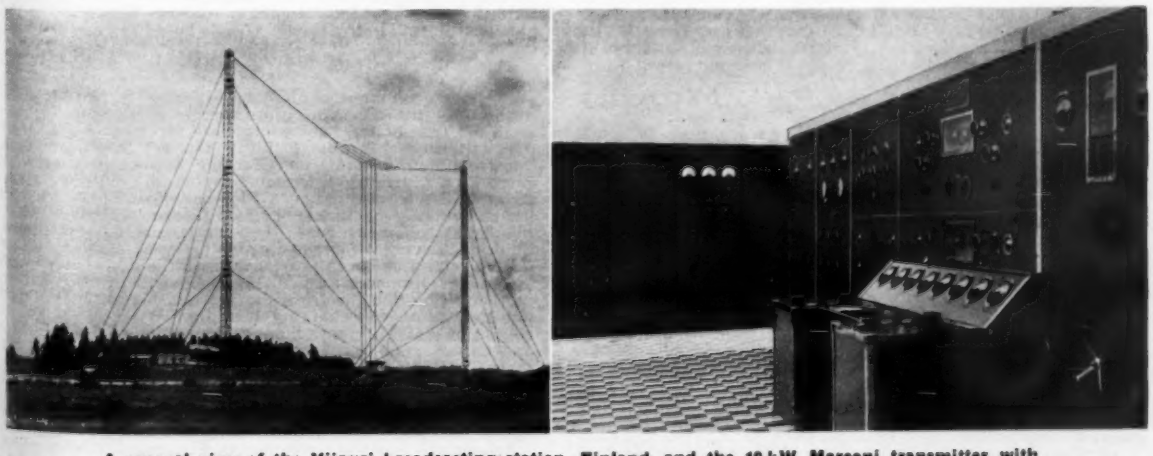
Switzerland.—TELEPHONE LOAN.—The Federal Council has granted a special loan of 31,000,000 fr. for improvements to the telephone system; 15,000,000 fr. will be devoted to renewals and additions of cables, and 16,000,000 fr. to the construction of new telephone exchanges on the semi-automatic system.

LEAGUE BROADCASTING STATION.—The League of Nations radio transmitting station, which is intended to be used in times of crisis, was opened at midnight on February 16th-17th by Sir Eric Drummond, Secretary-General of the League, who spoke to the American Continent.

Yorkshire.—TELEPHONE PROGRESS.—The annual report of the local T. & T. Advisory Committee for the year 1931 shows that in the West Yorkshire area of the north-eastern district (superintending engineer: Mr. J. W. Atkinson) the number of exchanges was 94, ranging from Leeds with 14,020 stations to Horton-in-Ribblesdale with 11 stations only. New telephones added numbered 7,871, but there were 6,027 cessations; the net increase was therefore 1,844, making the total 72,302. The number of automatic stations was 31,371, or 43.4 per cent. The number of automatic lines reached 19,826, or 42.6 per cent. Residence rate stations increased by 5.9 per cent. to 14,191, compared with an increase of 1.7 per cent. in business rate stations. New rural exchanges were opened at four places, thus increasing the number in use to eight. Two new manual exchanges were provided and several automatic ones were in course of erection, apart from extensions of existing equipment.

A new method of providing connections between the underground cable system and subscribers' premises was introduced during the year in the form of a covered pair of cadmium-copper wires, strong enough to be self-supporting. The advantages of this method are that the cost of installation is less than that of bare wires, and greater immunity from faults, involving loss of service, is secured.

A total of 53,295,400 calls originated in West Yorkshire consisting of 6,413,800 trunks and 46,881,600 local and junction calls, representing an increase of 10.4 per cent. "Personal" inland trunk calls proved to be increasingly popular, rising by 56 per cent. to 53,000. New kiosks numbered 54, making the total 744.



A general view of the Viipuri broadcasting station, Finland, and the 10-kW Marconi transmitter with control desk, main switchboard, &c.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—April 11th. City Council. Lift motors and control gear. (A.X. 11273.)*

Aylesbury.—March 14th. Electricity Department. General stores. (See this issue.)

Barnes.—March 8th. Urban District Council. 1,500-kW rotary convertor, transformer and starting switchgear. (February 19th.)

Bristol.—March 10th. Electricity Department. Meters. February 19th.)

Cheadle and Gatley.—March 8th. Urban District Council. 200-kVA transformer switch and distribution kiosk. (February 19th.)

Cleethorpes.—March 7th. Urban District Council. Cables and meters. (See this issue.)

Doncaster.—March 7th. West Riding Public Health and Housing Committee. Electric wiring at Tuberculosis Dispensary. County architect, County Hall, Wakefield.

Dover.—March 7th. Harbour Board. Electric cables and sundries for a year. Mr. Rutley Mowll, registrar, Castle Street (2s. 6d. each for schedules).

Dumfries.—February 29th. Corporation. Electric lighting installation at the new Municipal Chambers. Mr. T. Morton, 93, Irish Street (deposit £2 2s.).

Dumfriesshire.—February 27th. County Council. Electrical distribution scheme. (February 12th.)

Edinburgh.—March 10th. City Council. General electrical stores. (February 12th.)

Erith.—March 4th. Electricity Department. Cables, joint boxes, meters, cut-outs, and other accessories. (February 19th.)
March 18th. H.p. and l.p. switchgear and other apparatus for sub-station equipment. (See this issue.)

Galashiels.—February 29th. Town Council. Various works (including electrical) at 24 houses. Messrs. J. & J. Hall, architects, Galashiels.

Heston and Isleworth.—March 4th. Electricity Department. General stores. (February 19th.)

Hull.—March 14th. Electricity Department. Time switches. (February 12th.)

Ilford.—March 10th. Ilford and Barking Joint Sewerage Committee. Transformers, switchgear, &c., for new pumping station. (February 19th.)

Lanarkshire.—February 29th. County Council. Electric lighting at the Convalescent Home, Lanark. Mr. P. C. Smith, county housing and town planning engineer, 13, Clydesdale Street, Hamilton.

Lichfield.—March 3rd. Rural District Council. Electrically driven pumping plant. Mr. C. E. Mays, Council's engineer, Rural Council House, Lichfield (deposit £2 2s.).

London.—CENTRAL ELECTRICITY BOARD.—February 29th. 33-kV overhead transmission lines for South Scotland Electricity Scheme. (January 29th.)
March 8th. India Store Department. 33,000-V sub-station equipment. Director-General, Belvedere Road, S.E.1 (fee 5s.).
March 15th. County of London Electric Supply Co., Ltd. Cables and accessories for Barking power station extensions.

Manchester.—March 3rd. Electricity Committee. Static transformers. (February 19th.)

Middlesbrough.—March 1st. Education Committee. Electric lighting installation at Broomlands Children's Homes. Borough electrical engineer, Electricity Works, Snowdon Road, Middlesbrough.

Milford Haven.—February 29th. Electricity Department. Electrical goods and materials, including meters. (February 12th.)

New Zealand.—WELLINGTON.—March 30th. Adhesive insulating tape. (A.X. 11257.)*

Oakham.—February 29th. Electric lighting installation at the British Legion headquarters. Mr. E. W. Orrey, 40, High Street.

Oldham.—March 3rd. Public Assistance Committee. Electric lamps and fittings. Public assistance officer, Town Hall.
March 19th. Town Council. Electric lighting installation at 198 houses, Derker. Borough engineer and surveyor, Town Hall (deposit £1 1s.).

Perth.—February 29th. Electricity Department. Feeder and pilot cables. (February 12th.)

Plymouth.—March 7th. Belt conveyor. (February 12th.)

Rhondda.—March 26th. Urban District Council. Meters, copper wire and house service material. (February 19th.)

Salford.—March 5th. Electricity Department. General stores. (February 12th.)

Sleaford.—March 1st. Urban District Council. Metalclad switchgear. (February 12th.)

South Africa.—JOHANNESBURG.—March 19th. City Council. Tram track materials. (G.X. 11161.)*
March 19th. Sewage equipment. (G.X. 11182.)*
CAPETOWN.—April 6th. Electricity Department. L.p. ironclad switchgear. (A.X. 11274.)*

West Riding.—March 7th. Mental Hospitals Board. Six months' supply of electric lamps to mental hospitals at Menston, Storthes Hill, and Wadsley Bridge. Mental Hospitals Board's office, Wakefield.

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Barnstaple.—Town Council. Accepted. Two Diesel engines for the electricity works (£9,001).—Mirrlees, Bickerton & Day, Ltd.

Bexhill.—Electricity Committee. Recommended. Transformer (£110).—Foster Engineering Co. Switchgear (£190).—A. Reyrolle & Co. Cable (£1,156) and joint boxes (£32).—W. T. Glover & Co.

Beverley.—East Riding County Council. Accepted. Installation of electric lighting at the extensions to the County Hall.—Napier & Wheeldon, Ltd.

Croydon.—Electricity Committee. Recommended. Protective equipment (£510) and modification of existing cell-type switchgear (£1,596).—Metropolitan-Vickers. Induced draught fan bypass (£248).—Babcock & Wilcox, Ltd.

Dundee.—Public Health Committee. Accepted. Wiring of Maryfield Hospital extension (£152).—D. Morris.

Glasgow.—Corporation. Halls Committee. Accepted. Electrode steam boiler and two steam-heated copper calorifiers for the kitchen at Kelvin Hall (£1,140).—Bastian & Allen, Ltd.
Corporation Transport Committee. Accepted. Trolley wire.—Richard Johnson & Nephew; London Electric Wire Co. and Smiths, Ltd.

Government Contracts.—The following contracts were placed by the various Government departments during January:—

ADMIRALTY (CONTRACT & PURCHASE DEPARTMENT)

Batteries and cells.—Edison Swan Electric Co.; London Battery & Cable Co.; Chloride Electrical Storage Co.
Electric cable.—B.I. Cables; Derby Cables; Enfield Cable Works; G.E.C.; Hackbridge Cable Co.; Hooper's Telegraph and India Rubber Works; Henley's; Liverpool Electric Cable Co.; Siemens Bros. & Co.; St. Helens Cable & Rubber Co.
Electric capstans.—Sir W. Arrol & Co.
Electric cranes.—Cowans, Sheldon & Co.; Sir W. Arrol & Co.
Generating sets and compressor sets.—Ruston & Hornsby.
Mica and micanite.—Micanite & Insulators Co.; Mica and Micanite Supplies; Dacier; Attwater & Sons; Mica Mfg. Co.; A. Pearce & Co.
Searchlight projectors.—Laurence, Scott & Electromotors.
Centrifugal pumps.—Mather & Platt.
Switchboard.—Engineering & Lighting Equipment Co.
Switches, sockets, &c.—Edison Swan Co.; G.E.C.; Hawkers; W. McGeoch & Co.; Engineering & Lighting Equipment Co.

WAR OFFICE

Electric cable.—Callender's; Johnson & Phillips.
Electric annealing furnace.—Birmingham Electric Furnaces.
Switchboards.—J. H. Holmes & Co.

AIR MINISTRY

Paper insulated cable.—London Elec. Wire Co. & Smiths.
Aircraft engine magnetos.—B.T.-H.
Voltmeters.—G.E.C.

CROWN AGENTS FOR THE COLONIES

Electrical plant.—B.T.-H.

POST OFFICE

Telephonic apparatus.—Automatic Electric Co.; Edison Swan Co.; Ericsson Telephones; G.E.C.; Hall Telephone Accessories; Siemens Bros.; Standard Telephones and Cables.
Testing and protective apparatus.—Ericsson Telephones; G.E.C.; Phœnix Telephone & Elec. Works.
Wireless apparatus.—G.E.C.
Coin collecting boxes.—Hall Telephone Accessories.
Cable.—B.I. Cables; Connollys; G.E.C.; Hackbridge Cable Co.; Henley's; Macintosh Cable Co.; Pirelli-General Cable Works; Siemens Bros. & Co.; Standard Telephones & Cables.
Telephone cords.—Phœnix Telephone & Elec. Works; Standard Telephones & Cables.
Electric light fittings.—Engineering & Lighting Equipment Co.; Hailwood & Ackroyd; Veritys.
Electric lamps.—B.T.-H.
Flameproof wire.—Concordia Elec. Wire Co.
Cable manufacture, supply, drawing-in and jointing.—Wareham-Weymouth-Dorchester: Pirelli-General Cable Works. Oxford-Witney-Leafield: Henley's. Gallows Corner-Mark Tey: Siemens Bros. Derby-Leeds (Leeds-Barnsley section): B.I. Cables.
Re-conditioning cable.—Preston-Glasgow: Standard Telephones & Cables.
Telephone exchange equipment.—Birchfields (Birmingham); Swinton (Manchester); Stechford, Acocks Green (Birmingham); Ericsson Telephones. Sub-contractors for Stechford & Acocks Green: Pritchett & Gold & E.P.S. Co., for batteries; Electric Construction Co., Ltd., for charging and ringing machines. Elmbridge (Surrey): Ericsson Telephones. Sub-contractors: Chloride Electrical Storage Co., for batteries; E.C.C. for charging and ringing machines. Sheffield Central; Ilford; Woodseats (Sheffield): Siemens Bros. Sub-contractors for Woodseats: Chloride Electrical Storage Co. for batteries; English Electric Co., for charging machine; Small Electric Motors, for ringing machine. Ranmoor (Sheffield): Siemens Bros. Sub-contractors: Chloride Electrical Storage Co., for batteries; Crompton Parkinson, for charging machine; W. Jones & Co., for ringing machines. Bartholomew House: Standard Telephones and Cables. Sub-contractors: Chloride Electrical Storage Co., for batteries; Crompton Parkinson, for charging and ringing machines. Primrose (London); Cheltenham; Bangor (Co. Down); Ardrossan-Saltcoats (Ayrshire): Automatic Electric Co. Burslem (Hanley); Longton (Hanley); Newcastle-under-Lyme; Stoke-on-Trent; Bamber Bridge (Preston); G.E.C.
Telephonic repeater equipment.—Stranraer (Wigtownshire); Swansea: Standard Telephones & Cables. Marlborough; Ports-

mouth; Newport (Mon); Guildford: G.E.C. Sub-contractors for Guildford: D.P. Battery Co., for batteries.

E.h.p. transformers, oil switch-fuse units, &c.—West Central District Post Office Station, London: Ferguson, Pailin.

Wireless installation H.M. cable ship *Alert*.—International Marine Radio Co.

Wiring at Bucknalls, Watford, research station.—Keeble, Ltd.

Grimsby.—Highways Committee. Recommended. Erection of automatic traffic signals (£273).—Forest City Electrical Co. Electricity Committee. Recommended. Cables.—Metropolitan Cable Co., Ltd. (£1,448); Johnson & Phillips, Ltd. (£2,619).

Kent.—County Hospital Committee. Accepted. Lighting scheme for road at Leybourne Grange sanatorium (£367).—W. T. Henley's Telegraph Works Co., Ltd.

Leeds.—Electricity Committee. Accepted. Sub-station switchgear, Metropolitan-Vickers (£2,509); English Electric Co. (£1,329). Four 3,000-kVA transformers (£2,860).—British Electric Transformer Co. Cables.—W. T. Henley's Telegraph Works Co. (£116); Metropolitan Electric Cable & Construction Co. (£545).

Public Assistance Committee. Accepted. Control gear for two electric lifts at Rothwell institution (£135).—Rawlinsons, Ltd.

London.—ST. PANCRAS.—Contracts and Stores Committee. Recommended. Cable.—Hackbridge Cable Co. (£583); London Electric Wire Co. & Smiths, Ltd. (£150); Metropolitan Electric Cable and Construction Co. (£543).

GREENWICH.—Works Committee. Recommended. Electrical installation at welfare centre, Chevening Road (£120).—E. S. Fitzgerald.

HAMMERSMITH. — Electricity Committee. Recommended. Cable (£373).—Standard Telephones & Cables, Ltd. Switchpanel (£198).—General Electric Co., Ltd.

Southend-on-Sea.—Town Council. Accepted. Six electric lamps for lighting the cliffs (£159).—F. P. Richards & Co.

Weston-super-Mare.—Urban District Council. Accepted. Installation of pumping machinery at the Uphill Sewerage works (£3,322).—Lancashire Dynamo Co.

Forthcoming Events

Electrical Trades' Commercial Travellers' Association.—Friday, February 26th. Connaught Rooms, W.C. 6.30 for 7 p.m. Annual dinner.

Birmingham Electric Club.—Friday, February 26th. Grand Hotel, Birmingham. 7 p.m. "Developments in Commercial Communications." Mr. R. G. Griffiths.

Electrical Power Engineers' Association (*London Technical Group*).—Saturday, February 27th. Café Royal, W. 6.45 p.m. Annual dinner and dance.

Royal Institution.—Saturday, February 27th. Institution, London. 3 p.m. "The Electron." Lord Rutherford. Friday, March 4th. 9 p.m. "Michael Faraday and Electro-Chemistry." Sir Harold Hartley.

Société des Ingénieurs Civils de France.—Monday, February 29th. Institution of Electrical Engineers, London. 7.15 p.m. Joint meeting with I.E.E. Discussion on "The Standardisation of the Frequency of Electricity Supply in Paris." Opened by Monsieur P. J. A. Rieunier.

Institution of Electrical Engineers (*Wireless Section*).—Wednesday, March 2nd. Institution, London. 6 p.m. "Developments in the Testing of Radio Receivers." Mr. H. A. Thomas. (*South Midland Students' Section.*)—Saturday, February 27th. Visit to B.I.F., Birmingham. (*North-Western Students' Section.*)—Saturday, February 27th. 2.15 p.m. Visit to Metropolitan-Vickers Works, Trafford Park, Manchester. (*East Midland Sub-Centre.*)—Tuesday, March 1st. The College, Loughborough. 6.45 p.m. "Special Features of the Brush Ljungström Turbo-Alternator." Mr. C. Sutton. (*South Midland Centre.*)—Thursday, March 3rd. Joint meeting with the Institutions of Civil and Mechanical Engineers. (*Meter and Instrument Section.*)—Friday, March 4th. Institution, London, 7 p.m. "The Metering of E.H.P. Supplies on the Secondary Side of Step-Down Transformers." Mr. S. H. C. Morton. (*London Students' Section.*)—Friday, February 26th. Institution, London. 6.15 p.m. Discussion on "Photo-Electric Cells." Opened by Mr. F. Jervis Smith. Saturday, March 5th. 3 p.m. Visit to Charrington's Brewery, Mile End Road, E.

British Electrical Development Association (*North Midland Area*).—Wednesday, March 2nd. Electricity Works, Leeds. "Electrical Development with special reference to Domestic Electrification." Mr. J. N. Waite. (*Northern Counties Area*).—Thursday, March 3rd. Sopwith's Lounge, Newcastle-upon-Tyne. "Youth and Industry." Mr. A. Albrecht.

Electrical Association for Women.—Wednesday, March 2nd. 5 p.m. Visit to Holophane Demonstration Theatre, Elverton Street, S.W.

Lighting Service Bureau.—March 2nd and 3rd. 15, Savoy Street, W.C. Architects' Conference on Electric Lighting.

Physical Society.—Friday, March 4th. Imperial College of Science, S.W. 5 p.m. Short papers.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

ABCO lampholder.
BUSTLER vacuum cleaner.
DUTCH brand insulating tape.

Notes

Misuse of Electrical Appliances

Some trouble has been experienced at Rawtenstall owing to tenants of Corporation houses misusing the electrical equipment and appliances. A common cause of trouble has been consumers taking electrical energy for appliances through lampholders, without regard to the rating of the appliances themselves. Proposals are now engaging attention for the fixing of power plugs in Council houses. The borough electrical engineer has been asked to prepare a scheme to obviate damage and to report as to wiring.

Research at Birmingham University

In its annual report to the Senate, the Joint Standing Committee of the University of Birmingham states that the subjects towards which grants-in-aid have been made relate to "the causes of the wear and losses occurring at rubbing contacts on overhead power lines." Other subjects of research are: Characteristics and applications of selenium cells; research upon iron cores magnetised simultaneously by a.c. and d.c.; investigation concerning the theory of the induction-type watt-hour meter; the design of a low-reading watt-meter; the use of low-frequency induced currents for industrial lighting purposes; the use of vibrating wires as condensers; and investigation of thermo-electric direct-current transformers.

Extensions at Heriot-Watt College

The governors of the Heriot-Watt College have decided to proceed with the erection of the first section of the proposed extension of the college, at an estimated cost of £30,000. Accommodation will be provided in the first section of the extension for printing, mechanical engineering, drawing offices, and lecture rooms, and it will be possible to proceed with the building without disorganising the College work. It is hoped that building will commence towards the end of this year. This proposal represents the first section of a considerable extension already approved by the governors and the Scottish Education Department, and it is hoped that when this section is completed the remainder of the extension, the total cost of which is estimated at £140,000, in addition to £35,000 for equipment, will be proceeded with.

Electrical Luncheon at the B.I.F.

The first of the two "electrical" luncheons at the Birmingham Section of the British Industries Fair took place on Wednesday, when representatives of the E.C.A., the E.C.A. of Scotland, the Association of Consulting Engineers, the A.S.E.E., the tramway associations, the Illuminating Engineering Society and other bodies attended.

Mr. P. Bennett (J. Lucas, Ltd.) was in the chair and the principal speaker was Major Colville, Parliamentary Secretary to the Department of Overseas Trade. In his speech Major Colville said that while the Government could help industry private enterprise was the mainspring. The Export Credits Scheme now applied not only to bills of exchange but also to open accounts. The credits were granted for periods of up to five years and in several instances business had run into six figures. This necessitated close co-operation between business men and Government officials.

His Department last year cost only one five-hundredth part of the cost of social services. It was the Government's aim to redress the adverse trade balance. The new duties had decreased imports during December and January but exports had risen.

Sterling was the greatest medium for world trade and overseas buyers should buy now as the pound would appreciate. The restoration of world confidence was the only cure for the depression. By imposing tariffs Great Britain would influence the reduction of other countries' duties.

Dr. A. H. Railing (G.E.C.) briefly responded and urged that the Government should extend its industrial and marketing services, leaving business men to play their special part.

Water Power in America

In a report just issued by the U.S. Department of the Interior it is stated that the total capacity of water-power plant in the United States on January 1st was 15,562,805 h.p., an increase during last year of 681,000 h.p., or 4.3 per cent. In ten years the capacity has practically doubled, and the increase has averaged about 760,000 h.p. per year.

Architects and Electric Light

A conference has been arranged by the E.L.M.A. Lighting Service Bureau for March 2nd and 3rd, with a view to enabling architects to acquaint themselves with the most recent developments in the use of light in architecture. Several short lectures have been arranged and a large proportion of the time will be devoted to discussion. Visits will be paid to Broadcasting House and to the Saville Theatre. The proceedings on the two days will be opened by Mr. H. A. Lingard (chairman E.L.M.A. Council) and Sir John Brooke, C.B. (vice-chairman, Electricity Commission), and the lecturers will be Messrs. J. W. T. Walsh, L. E. Buckell, Waldo Maitland, R. Grierson, H. Lingard, W. J. Jones, F. Marsh and Howard Robinson.

All-electric Printing

The driving of large high-speed presses (such as those described in the article appearing in our issue of February 12th on "All-Electric Printing," by R. N. Tweedy) is, the Morse Chain Co., Ltd., informs us, generally accomplished by means of chain drives. The presses mentioned were driven by two Morse inverted-tooth chain drives, each transmitting 85 h.p.

Lightning Protection

Almost complete immunity from lightning failures and a reduction of fuse blowing, as well as a lowering of installation costs, are claimed to have been accomplished by a new scheme of connecting distribution transformers and lightning arresters, according to an announcement by the General Electric Company in the United States. The lightning arresters, which are suspended inside the transformer tanks, are connected to the incoming high-voltage lead and the earthed lead on the low-voltage side, the usual earth connection for arresters being omitted. The tank is left earthed in accordance with customary practice, but the secondary must be thoroughly earthed. Laboratory tests demonstrated improvement in protection, and the experience of several companies with this scheme has confirmed the tests. Additional tests in the field made last year with artificial lightning further verified the results.

The arresters are being produced for 2,400-V and 4,800-V service. They are made of "thyrite," a material that changes its resistance with the voltage. Each time the applied voltage is raised the resistance decreases, and it changes as quickly as does the applied voltage; the resistance can be decreased to a millionth of its original value in a time as short as a millionth of a second. The material is a good insulator at normal transformer voltages, but becomes a conductor for the discharge of lightning or voltage surges.

Fat Frying by Electricity

The substitution of a 4-kW deep fat frying electric kettle for two gas-fired kettles secured a saving of £16 per month, the *Electrical World* states. The monthly cost with gas amounted to £20 (fuel £4 13s., 350 lb. make-up fats £10 16s., loss of 200 lb. reclaimed grease £4 11s.). With the electrical equipment the monthly cost was £4 1s. (540 kWh at 1¼d., £3 6s. 6d.; interest, depreciation, and maintenance, 14s. 6d.). Economies were due to accurate temperature control and to the immersion of the heating source in the fat instead of placing it under the kettle. The kettle has two switches, one for each element. The temperature is automatically controlled within a range of 200 and 400 deg. F., the normal being 350 deg. F. The kettle is used from 14 to 18 hours daily (including Sundays).

E.A.W. Visit to Ediswan Showrooms

On Tuesday last a lecture was given by Mr. P. M. Edinborough on "Domestic Apparatus with particular reference to Electric Fires and Electro-medical Appliances," at the Charing Cross Road showrooms of the Edison Swan Electric Co., Ltd., to members of the Electrical Association for Women who are demonstrators in London showrooms. Mr. Edinborough suggested that the Association should form a committee which would collect suggestions forwarded from members in all parts of the country, and advise manufacturers as to what new tendencies in the design of domestic apparatus were and should be, and indicate how their activities in this connection should be utilised to meet the user's requirements. He then demonstrated various designs of electric fires and heating apparatus, and emphasised the increasing use of chromium plating.

Mr. Bartlett demonstrated and explained some electro-medical appliances suitable for ordinary domestic use, and an interesting discussion followed, during which members gave some helpful criticism of the appliances at present in use, and put forward suggestions for their improvement.

Finsbury Old Students' Association

The annual dinner of this Association will be held at the Trocadero on Saturday, March 12th. Particulars may be obtained from the hon. sec., Mr. F. R. C. Rouse, 15, Clifton Gardens, Golders Green, N.W.11.

The E.P.E.A. Dinner

The annual dinner of the Electrical Power Engineers' Association will be held at the Café Royal, Regent Street, W.1, on February 27th.

Birmingham Electric Club

The 21st annual dinner of the Birmingham Electric Club will be held on March 11th, at the Grand Hotel, Birmingham, at 7 p.m.

The German Radio Industry

Owing to the accentuation of the economic crisis in the country itself and the increasing export difficulties, the state of the German radio market has taken a very unfavourable turn. As compared with the seasonal revival in former years, the production in December is stated to have declined by 22 per cent., while the inland sales fell off by 75 per cent., as compared with the corresponding month in 1930, the diminution being ascribed to the fewer replacements of apparatus. During the second half of 1931 the exports declined 7 per cent. in value and one per cent. in quantity over the corresponding period of 1930, as the foreign exchange and currency difficulties, etc., considerably hampered the export business. This development is causing great concern among the makers, having regard to the large financial amount involved. Thus, out of the total exports of radio apparatus in the second half of last year amounting to 42.9 million marks, goods of the value of 6.41 million marks were sent to England, 5.06 millions to Sweden, 4.16 millions to Switzerland, 3.51 millions to Belgium, and 3.40 millions to Holland.

Chlorination of Condenser Water

Powerton generating station, Illinois, has a capacity of 215,000 kW in three units, and a 105,000 kW unit is under construction. The condensing equipment consists of two 50,000-sq. ft. and one 90,000-sq. ft. single-pass reversible-flow surface condensers with circulating pumps having a total capacity of 360,000 g.p.m. Condenser cleaning has become a major operation, *Power* states, owing to fungus growth.

The present chlorine installation was put into service in February, 1931. It consists of three chlorinators (each with a capacity of 450 lb. of chlorine gas for 24 hours), two 730-gal. solution tanks (filled with limestone), and six 200-g.p.m. rubber-lined solution pumps.

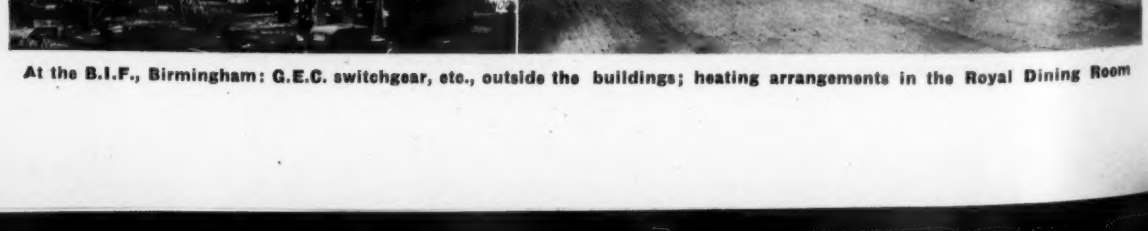
The average gain in vacuum during the year has been 0.24 in. Hg., the greatest improvement being in the summer months, whereas a gain of 0.06 in. would have paid for operation and maintenance. No corrosion has been observed, the manual cleaning has been reduced, and in no case has it been necessary to take a condenser out of service for cleaning.

Faraday House Scholarships

The annual examinations for a Faraday Scholarship of eighty guineas per annum, tenable for two years in college and one year in manufacturing works, and for a Maxwell Scholarship of sixty guineas per annum, tenable for two years in college and one year in works, will be held at Faraday House on April 5th, 6th and 7th, 1932. Exhibitions may also be awarded to candidates who acquit themselves creditably in the above examinations, but who do not obtain the necessary number of marks to qualify for the scholarships. The subjects for the Faraday Scholarship are: geometry, algebra, trigonometry, dynamics, statics, and hydrostatics, geometrical and freehand drawing, chemistry and physics. For the Maxwell Scholarship the subjects are: mathematics, dynamics, statics, and hydrostatics. Further particulars may be obtained from The Registrar, Faraday House Electrical Engineering College, 62-70, Southampton Row, W.C.1.

Effective Theatre Lighting

On page 301 we reproduce a number of photographs showing the lighting of the Little Theatre, Bournemouth, which was completed last year. Being designed for a theatre club, which like most others has had to consider expense, the lighting installation is of particular interest as an example of how efficient, yet none the less attractive, illumination may be achieved without excessive expenditure. The lighting fittings were supplied by Messrs. Best & Lloyd, while Messrs. Aish and Co., Bournemouth, were responsible for the installation work.



At the B.I.F., Birmingham: G.E.C. switchgear, etc., outside the buildings; heating arrangements in the Royal Dining Room

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. H. Bewes, of the Lancaster Corporation Electricity Department, has been appointed as chief clerk in the Bingley Council's electricity undertaking, in succession to **Mr. A. Senior,** who has taken up an appointment as chief clerk to the Middleton Corporation Electricity Department. Upon Mr. Senior leaving Bingley he was presented with an inscribed watch. The presentation was made by Mr. O. G. Cook, chief engineer and manager.

Mr. William Cruickshank, who recently retired from the position of assistant staff engineer in the Research Section of the Post Office, was managing editor of the *Post Office Electrical Engineers' Journal* for 18 years. Born in 1871, he studied technical subjects at Gordon's College, Aberdeen, and won the City and Guilds of London Institute silver medal in honours telephony. He joined the Engineering Department of the G.P.O. in 1901, and was transferred to the engineer-in-chief's office in 1905, where he was engaged in research work on loading coils. He then became a member of the teaching staff of the Northampton Institute, lecturing on telephony and telegraphy for 14 years. During the war he assisted Col. Purves in the design of new signal apparatus, and after the Armistice was sent to Cologne; for his services he received the personal thanks of the Secretary of State for War. He was responsible for the installation of the Electrical Communications Section at the Faraday Exhibition. Mr. Cruickshank has written many articles and papers on various subjects, and is a sound sportsman. His numerous friends will wish him many more years of robust health in his well-earned retirement in Glasgow.

Mr. W. Cruikshank, who recently retired from the Post Office service

Mr. J. A. Cook, F.C.I.P.A., became a partner in the firm of John E. Raworth & Moss, patent agents and consulting engineers, last year. The title of the firm is this week being changed to Raworth, Moss & Cook.

Mr. T. S. Blenkinsop, late chief engineer of International Combustion, Ltd., has joined the Mitchell Conveyor & Transport Co., Ltd., as manager of the Power Station Department.

Mr. J. A. Rushforth, chief inspector of telephones in the Post Office Engineering Department at Bradford, has retired after 41 years' service.

Major C. E. Prince, who has been elected president of Faraday House Old Students' Association, was born in Cape Town, but came to England when still a boy. He was educated at Clifton and afterwards served as a pupil to Messrs. Stothert & Pitt, of Bath. In 1896 he went to Faraday House, and from there spent a short time with Messrs. Wilson & Pilcher. An interval of ten years followed and Major Prince returned to scientific work in 1907, when he joined the Marconi Co., and became an assistant to Capt. H. J. Round in wireless telephony. He was one of the designers of the cavalry pack stations, and on the outbreak of war joined the Westmorland and Cumberland Yeomanry. He went to France in 1915 and on his return began the development of the wireless telephone for aircraft. After the war he rejoined the Marconi Co. and designed an aircraft wireless telephone for civil use. Later he invented an electric clock for which a private company was floated. His next appointment was with the Columbia Graphophone Co., but after being with this company for about a year he was appointed to his present position of technical managing director to the Radiovisor Parent Co.

Major C. E. Prince, President Faraday House Old Students' Association

Mr. A. H. Smith, formerly South Wales branch manager for Philips Lamps, Ltd., has now joined the staff of Measurement, Ltd., as that company's technical and sales representative for South Wales and the West of England.

[*Wakefields, Ealing.*

Mr. A. E. Pullen, who is retiring after 33 years' service with the Ealing undertaking

Mr. A. E. Pullen, chief assistant electrical engineer to Ealing Corporation, who, as announced in our last issue, is to retire after 33 years' service, was educated at the Commercial Travellers School, Pinner. He served his apprenticeship with Messrs. Kitson & Co., of Leeds, and afterwards joined Messrs. Wilson Hartnell, Leeds. From there he travelled south, to join Messrs. R. E. Crompton & Co., Chelmsford, where he was engaged in switchgear construction for the Kensington & Knightsbridge central station. Later he became chief assistant with the Bournemouth & District Electric Light Co., with whom he stayed for 3½ years. He left Bournemouth to take up an appointment with Huddersfield Corporation as chief assistant to Mr. A. B. Mountain. From Huddersfield he obtained the post of chief assistant to Mr. J. D. Knight, borough electrical engineer of Ealing, and has occupied that position for nearly 33 years.

Mr. William Taylor has been elected president of the Institution of Mechanical Engineers.

Mr. J. G. Statter, M.I.E.E., A.M.Inst.C.E., managing director of J. G. Statter & Co., Ltd., sailed on February 20th, on the s.s. *Ulysses,* for South Africa.

Mr. G. E. Taylor, chief engineer of the Electric Furnace Co., Ltd., has been appointed a director of the Company. He has been associated with the company for over 15 years.

Mr. W. Egerton, after 47 years' service at Bolton Post Office Engineering Department, has retired.

Obituary

Dr. W. D. Dye.—The death has occurred of Dr. William David Dye, F.R.S., A.C.G.I., head of Electrical Standards and Measurements Department of the National Physical Laboratory, in which position he succeeded Sir Frank Smith. His more recent work has been in connection with radio-frequency measurements and he contributed sections on these subjects to the "Dictionary of Applied Physics." Dr. Dye was only 44.

General Ferrié, the French wireless expert and organiser of the French wireless services, died on February 16th, at the age of 63, following an operation for appendicitis.—*Reuter.*

Professor Ernest Wilson.—The Institution of Electrical Engineers has lost a prominent and greatly respected member of its Council by the death of Professor Ernest Wilson, Emeritus Professor of Electrical Engineering at King's College, London, since 1930. The loss will be felt also by present and former students of King's, who have come under his inspiring influence during the past 40 years, and who regarded him as a friend even more than as a teacher. Professor Wilson succeeded Dr. John Hopkinson in the chair of electrical engineering in 1892. He was a Whitworth Scholar and a recipient of the Kelvin Premium. His published works included "Electric Traction" and several papers read before the I.E.E., The Royal Society, and other scientific bodies.

[*Press Portrait Bureau.*

The late Prof. Ernest Wilson

Mr. J. Anderson.—The death is recorded in *The Times* of Mr. James Anderson, late divisional manager in the Levant of the Eastern Telegraph Co., at the age of 75.

Col. O. Carleton Armstrong.—The death is reported of Col. Oliver Carleton Armstrong, on February 18th, at the age of 72. He was chairman of Greenwood & Batley, Ltd., and a member of the Council of the F.B.I.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Philco Eastern Distributors, Ltd.—Private company. Registered February 18th. Capital, £500 in £1 shares. Objects: To act as distributors of all wireless sets and commodities used in connection therewith manufactured by the Philco Radio and Television Corporation of Great Britain, Ltd., under an agreement dated January 21st, 1932. The directors are: F. H. Giffen, 3, Lemsford Road, St. Albans, and three others. Registered office: 26a, Chequer Street, St. Albans.

Electrified Utilities, Ltd.—Private company. Registered February 17th. Capital, £5,000 in £1 shares. Objects: To adopt an agreement with S. A. Pollock and to carry on the business of engineers, manufacturers of machinery and articles intended for the generation, storage and utilisation of electricity, &c. The first directors are: S. A. Pollock, Little Bush House, Kingsbury, N.W.9; R. W. Baron, 831, Finchley Road, Golders Green, N.W.11; and W. A. Stoops, Cliff House, Dovercourt.

S. Sassoon & Co., Ltd.—Private company. Registered February 17th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers and dealers in electric lamps, accumulators and batteries, wireless receivers, &c. The first directors are: J. Tabbush, 65, Houndsditch, E.C.3, and S. Sassoon, 7, Cite d'Hauteville, Paris. Registered office: 65, Houndsditch, E.C.3.

Liteon Products, Ltd.—Private company. Registered February 16th. Capital, £2,000 in 4s. shares. Objects: To acquire the business of an electrical engineer and dealer in electrical appliances, goods and apparatus carried on by J. Leslie Van Os, as "The Dominion Electrical Co.," at 6, Hanway Place, Oxford Street, W.1. The directors are: J. L. Van Os, 6, Hanway Place, Oxford Street, W.1, Lt.-Col. A. M. Berkeley, W. E. Smith, and J. N. Keenan, addresses not stated. Registered office: 6, Hanway Place, Oxford Street, W.1.

Turnpress, Ltd.—Private company. Registered February 15th. Capital £10,000 in £1 shares. Objects:—To carry on the business of manufacturers of and dealers in all kinds of electrical goods and appliances, radio merchants and manufacturers, &c. The subscribers are:—J. Prior, 7, Brazennose Street, Manchester; and Mrs. M. Prior, "Ronaleyn," 14, Granville Road. Timperley, Ches. Solicitor: J. Prior, 7, Brazennose Street, Manchester.

Escott Brothers, Ltd.—Private company. Registered February 15th. Capital £500 in £1 shares. Objects:—To acquire the business of electrical engineers carried on by C. H. Clarke, A. J. Escott, and L. H. Escott as "Clarke & Escott" at Wanstead, E.11. The permanent directors are:—C. H. Clarke (chairman), Dorincourt, Snaresbrook, Essex; A. J. Escott (managing director) and L. H. Escott, both of 51, Redbridge Lane, Wanstead, E.11. Solicitors: Wylfe, Patterson & Herring, 10, Coleman Street, E.C.2.

Bowyer-Lowe & A.E.D., Ltd.—Private company. Registered February 22nd. Capital, £5,000 in £1 shares. Objects: To acquire the stock in trade, plant, etc., belonging to Auto Electric Devices, Ltd., and to carry on the business of manufacturers of and dealers in electrical appliances in Brighton and elsewhere, and that of radio and radio gramophone manufacturers, electricians, etc. The first directors are: A. E. Bowyer-Lowe, Veloce, South View, Letchworth, and C. Hastings, 4, Eaton Mansions, Brighton. Secretary: C. Hastings. Registered office: Diamond Works, Coombe Road, Brighton.

Arthur Smith (Radio), Ltd.—Private company. Registered February 22nd. Capital, £1,000 in £1 shares. Objects: To acquire the business of a wireless dealer and manufacturer now carried on by A. H. Smith as "Arthur Smith" at 3, Park Parade, Harlesdon, N.W.10. The directors are: A. H. Smith (managing director), 3, Park Parade, Harlesden, N.W.10, and H. Smith, "Cordelia," 51, Holme Lacey Road, Lee, S.E.12. Secretary: H. Smith. Registered office: 56, Hazel Road, Kensal Rise, N.W.10.

Loudspeaker Engineering Co., Ltd.—Private company. Registered February 19th. Capital, £13,200 in 12,000 10 per cent. redeemable cumulative preference shares of £1 and 24,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers of wireless loudspeakers, wireless sets and gramophones, electrical, mechanical and general engineers, &c. The subscribers are: R. Tronton, 11, Copthall Court, E.C.2, and W. R. Darwin, 11, Copthall Court, E.C.2. Solicitors: Markby, Stewart & Wadesons, 5, Bishopsgate, E.C.2.

Returns of Electrical Companies

County of London Electric Supply Co., Ltd.—Particulars have been filed of debenture stock for £5,500,000 (inclusive of £5,000,000 already registered) authorised by resolutions of April 25th, 1927, July 31st, 1930, May 19th, 1931, and January 27th, 1932, and covered by trust deeds dated February 4th, 1932 (supplemental to trust deeds dated 1927, 1930, and 1931) the amount of the present issue being £500,000. Property charged: the company's undertaking and property, present and future, including uncalled capital. The trustees are the Electric and General Investment Co., Ltd., and Law Debenture Corporation, Ltd.

John Hands & Sons, Ltd.—Particulars filed of debenture stock for £40,000 authorised January 30th, 1932, and covered by trust deed of same date, charged on the company's undertaking and property, including any uncalled capital, the amount of the present issue being £35,230. Trustees: A. Cripwell and F. E. Bendall.

Hightensite (1930), Ltd.—S. Cole, of 18, Essex Street, W.C.2, was appointed receiver and manager on February 2nd, under powers contained in debentures dated October 17th, 1930.

Electric Development and Securities Trust, Ltd.—Capital, £650,000 in £1 shares. Return dated September 14th, 1931. All shares taken up. £126,890 10s. paid (being £1 per share on 14,401 and 15s. per share on 149,986 shares). £523,109 10s. considered as paid (being £1 per share on 485,613 and 5s. per share on 149,986 shares. Mortgages and charges at date of return: Nil. Since registered: Mortgage dated January 27th, 1932, to secure sums not exceeding at any one time, £500,000.

Mawdsleys, Ltd.—Capital, £20,000 in 13s. 4d. shares. Return dated November 2nd, 1931. 28,025 shares taken up. £10,683 6s. 8d. paid on 16,025 shares. £8,000 considered as paid on 12,000 shares. Mortgages and charges: £9,895 4s. 3d. (bank charge).

Western Electricity Supply Co., Ltd.—Capital, £350,000 in 100,000 6 per cent. cumulative preference and 250,000 ordinary shares of £1 each. Return dated November 17th, 1931. All shares taken up. £350,000 paid. Mortgages and charges: Nil.

Electric Supply Co. of Victoria, Ltd.—Capital, £325,000 in 175,000 preference and 150,000 ordinary shares of £1 each. Return dated November 11th, 1931. 175,000 preference and 125,000 ordinary shares taken up. £50,007 paid. £249,993 considered as paid. Mortgages and charges: Nil.

Credenda Conduits Co., Ltd.—Capital, £50,000 in £1 shares. Return dated November 10th, 1931. All shares taken up. £30,500 paid. £20,000 considered as paid. Mortgages and charges: Nil.

Ozonair, Ltd.—Capital, £44,000 in 77,600 preference and 322,400 ordinary shares of 2s. each. Return dated May 25th (filed December 2nd), 1931. 77,600 preference and 80,520 ordinary shares taken up. £4,252 paid on 42,520 ordinary shares. £11,560 considered as paid on 38,000 ordinary and 77,600 preference shares. Mortgages and charges: Nil.

Sun Electrical Co., Ltd.—Capital, £250,000 in 125,000 preference and 125,000 ordinary shares of £1 each. Return dated October 9th, 1931. 105,658 preference and 93,311 ordinary shares taken up. £198,969 paid. Mortgages and charges: Nil.

Magna Wire & Cable Co., Ltd.—Capital, £11,000 in 10,000 preference shares of £1 and 20,000 ordinary shares of 1s. each. Return dated October 20th, 1931. 2,027 preference and 11,500 ordinary shares taken up. £2,027 paid on the preference shares. £575 considered as paid on the ordinary shares. Mortgages and charges: Nil.

Langs (Wimbledon), Ltd.—Debenture dated January 25th, to secure £1,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. V. C. Renwick, Rose Bank, Scotts Lane, Shortlands.

A. Bodkin & Co., Ltd.—Capital, £3,000 in £1 shares. Return dated September 17th, 1931. All shares taken up. £1,000 paid. £2,000 considered as paid. Mortgages and charges: Nil.

British Electric Refrigerator Co., Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1931. 50 shares taken up. £50 paid. Mortgages and charges: Nil.

Stearn Electric Co., Ltd.—Capital, £4,000 in £1 shares. Return dated October 20th, 1931. All shares taken up. £2 paid. £3,998 considered as paid. Mortgages and charges: £9,700.

Hewittic Electric Co., Ltd.—Capital, £50,000 in £1 shares. Return dated October 12th, 1931. 40,000 shares taken up. £40,000 paid. Mortgages and charges: Nil.

Phœnix Dynamo Mfg. Co., Ltd.—Capital, £100 in £1 shares. Return dated January 5th, 1932. Two shares taken up. £2 paid. Mortgages and charges: Nil.

Eureka Vacuum Cleaner Co., Ltd.—Debenture dated January 28th, to secure £8,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.

Siemens Brothers & Co., Ltd.—Satisfaction to the extent of £38,100 on January 1st, 1932, of debenture stock secured by trust deed dated January 15th, 1918 and registered January 21st, 1918.

City Notes

The North Metropolitan Electric Power Supply Co. held its annual meeting on February 23rd, Lord Ashfield (chairman) presiding. In presenting the report and accounts (ELEC. REV., February 19th, p. 292), the chairman said that despite world-wide economic and industrial depression which had affected all classes, the company's business had continued to expand. The electricity sold during 1931 amounted to 259,900,000 kWh, an increase of 13.7 per cent. as compared with the preceding year, and the total number of consumers supplied directly was 86,754, an increase of 20 per cent. The results for the year were affected by reductions in electricity charges and by the abolition of meter rentals which came into force in the autumn of 1930. They had acquired a controlling interest in the Bishop's Stortford, Harlow and Epping Gas and Electricity Co., which had for several years taken a bulk supply from the company. The capital expenditure during the year under review amounted to £485,097, the great bulk of which was incurred in connection with the extension and technical improvement of the distribution system. The issued capital had been increased by the 43,116 preference shares and 57,415 ordinary shares issued to the stockholders of the Bishop's Stortford Co. An allocation of £183,000 had been made from net revenue to reserve, which now stood at £1,534,088. Early in the current year the new section of the Brimsdown generating station would be in commercial operation. This section would increase the capacity of the station from 50,000 kW to 100,000 kW. Regarding the question of electricity charges it was their policy to provide as cheap and as attractive a service to the public as the circumstances permitted, and they did so upon terms at least as favourable as could be offered by any other authority. They had opened their eighteenth showroom in conformity with their practice of providing in each of their more important districts a showroom and a complete local organisation for the service of their consumers. They had commenced to display illuminated posters for which there was a big future.

Lord Ashfield, in expressing the company's thanks to the staff, specially mentioned Capt. J. M. Donaldson, the chief engineer, and his election as president of the I.E.E.

Electrical Distribution of Yorkshire, Ltd., reports a profit for 1931 of £116,828, as compared with £106,319 in the preceding year, to which is added £22,326 brought in making £139,154. The directors propose to place £20,000 to reserve and to pay an ordinary dividend at the rate of 9 per cent. per annum, less tax at 5s., leaving £21,788 to be carried forward. The number of consumers increased during the year by 6,694 to 48,521 and the sales of electrical energy from 20,668,613 to 24,977,018 kWh. The report states that the hire and hire-purchase of electrical apparatus for domestic purposes is increasing, and the company has obtained an Order to supply electricity in parts of the urban district of Otley and the rural district of Wharfedale, bringing the total area of supply to over 1,200 sq. miles. An issue of 100,000 ordinary shares made in March last was applied for more than five times. An extraordinary meeting will be held on April 5th to authorise an increase of capital and to adopt new articles of association. It is proposed to offer 400,000 6 per cent. cumulative preference shares at 21s. per share without any restriction in the number of shares which may be applied for. Meeting: March 1st.

Metropolitan Railway Co.—The accounts of this company were abstracted in our last issue, p. 293, and the annual meeting was held on February 18th. Lord Aberconway (chairman), who presided, said that the accounts disclosed a more satisfactory position than might have been anticipated from the decreases in traffics which were particularly heavy during the last three months of the past year. In addition to the general depression another main factor which affected receipts adversely during the year was increased motor-coach competition, which from February last was greatly intensified. They had been able to complete contracts for materials for the present year at prices which in only three or four minor instances exceeded the prices current in 1931 and in many instances at prices which represented a considerable saving on the prices paid in 1931. With regard to the London Passenger Transport Bill they would press their demand to be treated on the same footing as the grouped companies.

The Northampton Electric Light & Power Co., Ltd., reports a revenue of £264,371 for 1931, as compared with £239,764 in the previous year, and expenses of £160,650 (£149,838), leaving a balance of £117,195. After providing for debenture interest, &c., it is proposed to pay a final ordinary dividend of 6 per cent., making 10 per cent. for the year (same), leaving £10,250 to be carried forward, against £10,009 brought in. The report states that further extensions have been made in both the urban and rural areas. The sales of electricity increased from 38,310,015 kWh to 44,569,297 kWh.

The Rushden & District Electric Supply Co., Ltd., reports a total income of £38,721 for the year ended December 31st last, as compared with £33,653 in the preceding year, and expenses of £27,664 (£24,928), leaving a balance of £11,057, to which is added £1,494 brought forward, making £12,551. After deducting debenture interest, &c., it is proposed to pay a final dividend of 4½ per cent., making 8 per cent. for the year (same), and to carry forward £1,516. In November the capital of the company was increased from £75,000 to £100,000, and 15,000 shares were issued to shareholders at 25s. per share. Electricity sold totalled 4,216,275 kWh, an increase of nearly 16 per cent. as compared with 1930.

Potters, Ltd., have now declared an interim dividend on the 7½ per cent. cumulative preference shares for the half-year ended September 30th last, less tax, at 5s. 6d. The company states that the prevailing conditions in industry and particularly the state of export trade due to world economic conditions, have seriously affected it in common with all similar undertakings. Great improvements have been made in its products, and new models have been introduced which will enable immediate advantage to be taken of improved conditions as soon as they arise.

The Chiswick Electric Supply Corporation, Ltd., in its report for 1931, shows a profit of £27,704, as compared with £25,445 in the preceding year. It is proposed to pay a final dividend of 6 per cent., making 11 per cent. for the year (against 12 per cent.), while refund to consumers absorbs £3,309. General reserve receives £1,000 and £3,991 is carried forward. The sum of £3,886 has been added to depreciation reserve, being £5,026 from income on investments and £3,860 from net revenue account.

Vickers, Ltd., have declared final dividends of 2½ per cent. on the preferred 5 per cent. stock, less tax, the 5 per cent. preference shares, less tax, and on the cumulative preference shares, free of tax.

The Mersey Railway Co. reports a net revenue for the year ended December 31st last of £87,203 as compared with £90,969 in the preceding year, to which is added £4,000 brought in making £91,204 available. After deducting debenture interest and appropriating £2,000 to general reserve, it is proposed to pay a dividend of ¾ per cent. on the consolidated ordinary stock (against one per cent.), leaving £4,083 to be carried forward. Meeting: To-day (Friday).

The Midland Electric Manufacturing Co., Ltd., shows a net profit of £38,946 for 1931, as compared with £44,140 in the preceding year. After providing for depreciation, and adding £19,123 brought in, £50,993 is available. An ordinary dividend of 10 per cent., plus a bonus of 12½ per cent. is proposed, and £17,790 is carried forward.

Clarke, Chapman & Co., Ltd., report a net profit of £25,298 for 1931 (against £83,838), and after deducting depreciation, &c., and adding £24,065 brought in, £41,353 is available. As announced in our last issue, a final ordinary dividend of 2½ per cent. is proposed, making 5 per cent. for the year (against 10 per cent.), leaving £13,635 to be carried forward.

The Mid-Southern District Utility Co. reports a revenue for 1931 of £276,382, as compared with £248,772 in 1930, and expenditure of £212,109 (against £192,882), leaving a surplus of £64,272. It is proposed to pay the full statutory dividends on the various stocks, less tax.

Mather & Platt, Ltd., show a net profit of £76,124 for 1931, as compared with £102,264 in 1930. As announced in our last issue, the ordinary dividend is 6 per cent. (against 10 per cent.), and the amount carried forward is £30,058.

The Clyde Valley Electrical Power Co. has declared a final dividend of 4 per cent. on the ordinary shares, making 7 per cent. for the year (against 8 per cent. in 1930).

Grosvenor Electric Batteries, Ltd., have declared an interim ordinary dividend of 5 per cent.

The St. James' & Pall Mall Electric Light Co., Ltd., held an extraordinary meeting on February 23rd, when a resolution was passed authorising an increase of capital from £800,000 to £1,000,000 by the creation of 200,000 shares of £1 each.

At the annual meeting which followed the Earl of Balfour (chairman), in the course of his speech, said the capital expenditure during the year (£54,290) was mainly upon machinery, fixed plant and mains in connection with the change-over of the system of supply from d.c. to a.c. The board, in conjunction with the directors of certain other companies operating in the West End, had agreed to the establishment of a joint committee consisting of representatives of the London & Home Counties Joint Electricity Authority and the companies for the purpose of advising on any questions which might arise in the administration of the 1925 Act. They had capitalised the major part of the free reserves, and intended to distribute to the ordinary shareholders a share bonus equivalent to 15 per cent. of their present holdings, such bonus shares ranking *pari passu* with the ordinary shares. The report and accounts were adopted.

The Westminster Electric Supply Corporation, Ltd., held its annual meeting on February 23rd, when Lord Wargrave (chairman), in the course of his speech, said he was pleased to be able to report an expansion in the company's output during the past year of 4 per cent. He reminded shareholders that the London Electricity (No. 2) Act, 1925, provided that as from January 1st, 1932, the standard dividend of the company should be at the rate of 7 per cent., subject to the possibility of increases under the sliding scale provisions. The standard dividend would, of course, include 7 per cent. on the December issue of fully paid shares. It might be safely assumed as unlikely that the amounts available for ordinary shareholders under the sliding scale would be of the same proportions in the future as in past years. The report and accounts were adopted.

Stocks and Shares

TUESDAY EVENING.

THE fall in Bank Rate which occurred on the Thursday in last week, reducing the minimum from 6 per cent. to 5 per cent., has been hailed in the Stock Exchange as a probable precursor to a further lowering of the Rate as soon as the political horizon in the Far East becomes clearer. Hopes are now fixed upon an early resumption of freedom of dealing in foreign exchanges. This, when it materialises, will go far to restore something like normal conditions of trade between the nations of the world. America has already taken an important step in the same direction through a policy which, stripped of verbiage, amounts to inflation. The lowering of Bank Rate here, and the greater elasticity of the financial position as it obtains in Paris, are indications of a return to a more healthy international situation. The war between China and Japan is being watched with close attention, though at present it has had little effect upon the prices of stocks and shares other than those connected with the two countries engaged in hostilities.

Gilt-edged Improvement

The gilt-edged market has shown a decided improvement, responding at once to the reduction in Bank Rate. Central Electricity 5 per cent. new debenture scrip, which had been down to 2¾ discount, improved to ¾ discount, a rise of 1½. The fully paid stock is quoted at 94½. Apparently some of the holders of the Board's 4½ per cent. debenture stock have been exchanging into the newer issue, for the former has dropped back to 85½. County of London new debenture strengthened to 99, London Power debenture to 99½. General Electric debenture advanced to 99. The same tendency is noticeable amongst preference shares. British Thomson-Houston preference are 6d. higher at 23s. General Electric "B" preference are similarly better at 26s. Once more the difficulty is rather to find sound stock at tempting prices than to "make buyers," as the Stock Exchange phrase is, for such stock when it comes to market. The advice recently tendered to holders of gilt-edged securities that they should sell these and put the money into what are called "equity" stocks and shares was not generally acted upon, and those who retained their gilt-edged securities must feel somewhat pleased with the result of their decision. Metropolitan Electric 7 per cent. extension debenture has risen to 103, and Midland Counties 5 per cent. debenture to 97½.

Home Railway Stocks

The Underground Electric Railways Company of London announced a total net income for 1931 of £1,193,697. The traffic receipts of five of the chief operating companies owned by the Underground Railways were £291,000 down, attributed by the company to increased unemployment, unfavourable summer weather, and the financial crisis. The dividend, as we mentioned last week, fell 1 per cent. to 7 per cent., but the price of the shares is better at 20s. The heavy falls in Metropolitans and in Districts have been stayed, both stocks recovering to a slight extent. Metropolitans at the present price still return nearly 10 per cent. on the money.

British Electric Traction deferred ordinary stock has risen to 725, showing a gain of 75 points on the week. The demand for a comparatively small amount of stock had a disproportionate effect upon the quotation. London Traction shares show no alterations.

Home Electricity Supply

The Electrical Distribution of Yorkshire, and the Northampton Electric Light and Power Co., quotation of whose shares now appears in our lists, are taking powers for the raising of fresh capital. The Electrical Distribution of Yorkshire pays 9 per cent. for the year, the same as that for 1930. The ordinary shares stand at 32s., and the company seeks power to offer £400,000 6 per cent. cumulative preference shares at a guinea per share. The meeting to pass the necessary resolutions will be held on Tuesday, next week, March 1st. The Northampton Company is paying 10 per cent. for the year, also the same as that distributed in 1930, and the meeting to consider the resolutions for creating 300,000 new ordinary £1 shares is to be held on the Friday in this week. Both these companies publish figures showing sound progress, and no doubt the proposals to increase the capitals will be passed without opposition. The price of Northampton ordinary shares stands at 39s. 6d., and the company's 5 per cent. debenture stock is quoted at 97. Midland Electric Power shares are a little easier at 27s. 6d. Yorkshire Electrics have gained 2s., at 33s. 3d. The movements in the London group are of no particular significance, Chelseas being 6d. down at 25s. 6d., City of London 6d. up at 35s. Metropolitan ordinary advanced to 39s. 6d. Of the preference shares, North Metropolitan 6 per cent. advanced to 23s. The same company's debenture stocks both rose to 103.

New Shares

Prices of the newly issued shares in the London electricity supply section are as follows:—

Brompton	24s. 9d.	London	25s. 9d.
Chelsea	24s. 3d.	Metropolitans	38s. 6d.
Charing Cross ...	27s. 0d.	Westminster	25s. 3d.

The fact that some of these companies have written the new shares straight into proprietors' names, without intermediate allotment and renunciation letters, is responsible for the comparative paucity of business which is the only noteworthy feature in connection with these newly issued shares. It deserves to be noted that the creation and allotment of new capital has had no effect upon existing prices, tending to show, of course, that holders are content to retain their investments as being thoroughly satisfactory. New shares have been added to previous holdings, rather than sold in order to take the profit by way of extra dividend.

Dollar Stocks

The Shawinigan Water and Power Company, in its annual report, shows net earnings, before depreciation, of 4¾ million dollars. The figure for 1930 was a little over 6½ million dollars; for 1929, nearly 6 million dollars. The company was put to an unforeseen expense of 200,000 dollars by the necessity for purchasing funds in New York in order to meet the wishes of holders who desired to have their interest on the company's bonds paid to them in United States money. This element will persist so long as there is disparity in the value of Canadian and United States funds. The Shawinigan quarterly dividend has been reduced from 62½ cents to 50 cents per share. The price of the shares is 31, the same as a week ago, and that of Power Corporation of Canada, at 27½, is also unchanged. Tokyo Electric sixes, in the sterling group, hardened to 85. Brazilians are a little better. San Paulo Electric 5 per cent. first mortgage bonds rose to 77½. Brazilian Tractions advanced to 17½, it being rumoured that the shares are to be officially quoted next Monday on the Paris Bourse.

Cables and Wireless

Traffic receipts continue to be disappointing, with the result that further falls are shown in each of the Cables and Wireless trio. The "A" ordinary stock has suffered principally, with a drop of 2 points to 13. Globe Telegraph preference fell back to 6¾. On the other hand, the Anglo-American list is rather better, and the 6 per cent. preferred stock of the Anglo-American Telegraph Company advanced to 91. Telegraph Constructions, after being down to 9, recovered to 10. American Telephone and Telegraphs remained at 190. The quotation for the shares has been added to the adjoining price-lists. (It will be observed that space has also been found for the inclusion of Ever Ready shares.) International Telephones came back to 16 after touching 17.

Manufacturing and Equipment

The rise in Americans has had a favourable effect upon Associated Electrical Industries ordinary, and the price at 21s. 3d. is 9d. up. British Insulated at 2 9/16, and Johnson and Phillips at 22s. 6d. are 1/16 down. A similar fraction has been gained by Henley's at £5. Callender's are ¼ better at 51s. 3d. The market for these industrials is steady, without there being any particular amount of business. Iron and steel shares, on the other hand, are dull, Vickers going back to 8s. 3d., and Babcocks to 43s. 9d., the latter showing a fall of 1/16. Upon vague reports that the Dutch had agreed to restriction of rubber output, a slight improvement occurred in the rubber share market.

Share List of Electrical Companies

Home Electricity Companies

	Nom.	Approx. Dividend. 1929.	1930.	Price, Feb. 23, 1932.	Rise or Fall.	Yield p.a. £ s. d.
Bournemouth and Poole	1	15	15	58/3	—	5 3 0
Brompton Ordinary	1	8½	8½	26/-	−1/6	5 7 8
Central Electricity 4½% Deb.	Stock	—	4½	85½	−1½	5 5 3
Charing Cross Ordinary	1	8½	8½	28/6	+6d.	4 18 3
Chelsea	1	8½	8½	25/6	−6d.	5 9 10
City of London	1	10	10	35/-	+6d.	5 14 3
Clyde Valley	1	8	8	28/9	−2/6	5 11 4
County of London	1	11	11	44/6	—	4 18 10
Edmundsons' 7% Pref.	1	7	7	23/6	—	5 19 2
Elec. Dis. Yorkshire	1	9	9	32/-	—	5 12 6
Elec. Supply Corporation	1	11	11	42/6	—	5 3 6
Kensington Ordinary	1	8	8	29/-	—	4 16 7
Lancs. Light and Power	1	7	6½	23/9	—	5 7 9
London & Home Counties 4½% Deb.	Stock	—	4½	87	—	5 3 6
London Electric	1	8½	9	27/-xd	—	5 3 6
Metropolitan	1	9	10	39/6	+9d.	5 1 3
Midland Counties	1	6½	7	27/-	—	5 3 6
Mid. Elec. Power	1	15	8	27/6	−½	5 16 5
Newcastle-on-Tyne Ordinary	1	6	6	23/3	—	5 3 3
Do. 7% Pref.	1	7	7	28/-	—	5 7 8
Northampton	1	10	10	40/-	—	5 0 0
Notting Hill 6% Pref.	10	6	6	10½	—	5 14 3
North Met. Elec. 6% Pref.	1	6	6	23/-	+6d.	5 4 4
St. James' and Pall Mall	1	8	8	28/6	—	4 18 3
Scottish Power	1	8	8	27/-	—	5 18 5
South London	1	8½	8½	25/6	—	5 9 8
Urban Ordinary	1	7	7	27/-	—	5 3 6
Westminster Ordinary	1	8½	8½	26/-	—	5 7 8
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/-	—	7 2 10
Yorkshire Elec.	1	8	8	33/3	+2/-	4 16 3

Home Rails

		1930.	1931.			
Central London Ord. Assented	Stock	4	4	66½	—	6 0 1
Metropolitan	,,	4	3½	35½	+1	9 17 2
Do. District	,,	5	4½	54½	+1	8 5 2
Underground Electric	1	8	7	1	+1/-	7 0 0

Telegraphs and Telephones

		1929.	1930.			
American Tel. & Tel.	$100	9	9	190	—	4 14 9
Anglo-Am. Tel. Pref.	Stock	6	6	91	+1	6 11 10
Do. Def.	,,	1½	1½	21	—	6 19 6
Cables & Wireless 5½% Pref.	Stock	5½	5½	44½	−1	—
Do. A 7½% Ord.	,,	Nil	—	13	−2	—
Do. B Ord.	,,	Nil	—	9½	−½	—
Globe Tel. and T. Ord.	10	10	8½	6	—	—
Do. do. Pref.	10	6	6	6½	−½	8 17 10
Great Northern Tel.	10	20	20	22½	—	8 18 0
Marconi-Marine	1	15	15	31/3	—	9 12 0
Oriental Telephone Ord.	1	12	12	2½	—	*5 16 0

Home and Foreign Trams, etc.

Anglo-Arg. Trams First Pref.	5	5½	—	6/3	—	—
Do. do. 2nd Pref.	5	6	—	3/9	—	—
Do. do. 5% Deb.	Stock	5	5	16½	—	—
British Electric Traction Def. Ord.	,,	5	5	725	+75	—
Do. do. Pref. Ord.	,,	8	8	110	—	7 5 6
Brazil Traction	100	8	—	17½	+½	5 14 3
Brit. Columbia Elec. Rly. Pcs.	Stock	5	5	82½	—	6 1 5
London & Sub. Trac. 5% Pref.	1	Nil	Nil	7/-	—	—
London United Tram Deb.	Stock	4	4	55½	—	7 4 2
Mexico Trams, 5% Bonds	—	5	5	35½	—	14 1 9
Mexican Light Common	100	Nil	Nil	22½	—	—
Do. 7% Pref.	100	7	7	30½	—	22 19 0
Do. 1st Bonds	—	5	5	62½	—	8 0 0
Victoria Falls Ord.	1	15	15	55/-	—	5 9 1
Yorkshire (West Riding)	1	Nil	Nil	6/3	—	—

Manufacturing Companies

Assoc. Elec. Ord.	1	6	6	21/3	+9d.	5 13 0
Do. Pref.	1	8	8	26/3	—	6 2 0
Babcock & Wilcox	1	15	14	43/9	−½	*6 7 10
British Aluminium Ord.	1	10	10	25/-	—	8 0 0
British Insulated Ord.	1	15	15	2½	−½	5 17 1
Brush Ord.	Stock	10	5	60	—	8 6 8
Callender's	1	15	15	2½	−¼	5 17 1
Do. 6½% Pref.	1	6½	6½	22/6	—	5 15 5
Crompton Parkinson Ord.	5/-	30	30	18/9	—	8 0 0
Do. 8% Pref.	1	8	8	26/3	—	6 2 0
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 0 0
Do. 5% Deb.	Stock	5	5	89½	—	5 11 10
Electric Construction	1	5	Nil	7/6	—	—
Enfield Cable Ord.	1	25	25	3½	—	6 8 10
English Electric	1	Nil	Nil	7/6	—	—
Do. do. Pref.	1	Nil	Nil	7/6	—	—
Ever Ready	5/-	35	35	21/6	—	8 2 10
Ferranti Pref.	1	7	7	20/9	—	6 15 6
G.E.C. Pref.	1	6½	6½	23/-	—	5 13 1
Do. Ord.	1	14	10	42/-	—	4 15 3
Henley's	1	30	30	5	+⅛	6 0 0
Do. 4½% Pref.	5	4½	4½	4½	—	5 0 1
India-Rubber	1	Nil	Nil	5/9	—	—
Johnson & Phillips	1	10	10	22/6	−½	8 16 5
Siemens Ord.	1	7½	7½	21/3	—	7 1 2
Telegraph Construction	12	10	7½	10	—	—

* Dividends paid free of Income Tax.

Published Specifications

COMPILED expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1930

22,055. "Production and modulation of electric currents." J. H. O. Harries. July 22nd, 1930. (Addition to 328,680.) (366,053.)

22,409. "Arrangement for protection against electric surges." Dubilier Condenser Co. (1925), Ltd. July 30th, 1929. (366,056.)

25,606. "Electric batteries." W. W. Triggs (National Carbon Co., Inc.). August 27th, 1930. (366,080.)

26,322. "Insulated resistance wire and methods of forming an insulating coating thereon." Sirian Lamp Co. September 23rd, 1929. (366,004.)

28,486. "Electromagnets." Siemens Bros. & Co., Ltd., and E. A. Forceville. September 23rd, 1930. (366,062.)

28,844. "Electric totalisators." Siemens Bros. & Co., Ltd., J. H. Broome, and R. I. H. Clarke. September 26th, 1930. (366,064.)

29,265. "Arrangement for the selective distance protection of polyphase lines." Akt.-Ges. Brown Boveri et Cie. January 23rd, 1930. (366,108.)

29,765. "Electrical rheostat with a ring-shaped sliding contact." A. Ulitowsky and N. Levitzky-Rogalia. October 4th, 1930. (366,150.)

31,540. "Electric ship propulsion systems." General Electric Co., Ltd., and H. J. Coates. October 21st, 1930. (366,067.)

31,633. "Electric motors." K. Von Dreger. August 30th, 1930. (366,068.)

32,011. "Electrical indicating device for motor vehicle circuits." Sport Soc. Anon. October 26th, 1929. (366,085.)

32,065. "Apparatus used in the electrical reproduction of sound." F. H. Constable and Radiovisor Parent, Ltd. October 24th, 1930. (366,086.)

32,174. "Electromagnetic counting mechanisms." Standard Telephones & Cables, Ltd. (L. J. J. Schreiber). October 27th, 1930. (366,023.)

32,502. "Holders for thermionic valves." Electrical Research Products Inc. October 30th, 1929. (366,089.)

32,508. "Electric cables." A. Carpmael (I.G. Farbenindustrie Akt.-Ges.). October 29th, 1930. (366,091.)

32,537. "Vacuum tube electrical oscillation generators." P. D. F. David. November 23rd, 1929. (366,094.)

32,654. "Inductance coils." Lissen, Ltd. (in liquidation), and W. H. Fuller. October 30th, 1930. (366,126.)

32,682. "Electric relays." British Power Railway Signal Co., Ltd., Park Royal Engineering Co., Ltd., S. L. Glenn, and J. A. G. Ogilvie. October 30th, 1930. (366,127.)

32,939. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., R. Taylor, and J. A. Mason. November 1st, 1930. (366,143.)

35,479. "Dynamo electric machines." British Thomson-Houston Co., Ltd. November 27th, 1929. (366,184.)

35,700. "Moving coil galvanometers suitable for electric speed indicators." J. W. Record and Record Electrical Co., Ltd. November 27th, 1930. (366,189.)

37,022. "Electric calculating apparatus." N. Waldstein. December 6th, 1929. (366,203.)

37,444. "Filter systems for rectified current." Kolster-Brandes, Ltd. (Kolster Radio Corp.). December 11th, 1930. (366,209.)

37,542. "Snap action electric switches." C. L. Arnold and M.K. Electric, Ltd. December 12th, 1930. (366,211.)

37,586. "Radio-receiving apparatus." E. K. Cole, Ltd., and E. J. Wyborn. December 12th, 1930. (366,212.)

37,694. "Method and means for compensating for the effects of temperature and voltage changes on light sensitive circuits." S. E. Cluderay and Radiovisor Parent, Ltd. December 13th, 1930. (366,213.)

37,717. "Electrical machines, apparatus, and appliances of the flameproof type." Veritys, Ltd., and H. W. Smallwood. December 15th, 1930. (366,215.)

37,735. "Multiple-connection distribution boards for electric circuits." A. Linker. December 17th, 1929. (366,216.)

37,858. "Electric heating of buildings." R. Grierson and Dulrae Patents, Ltd. December 16th, 1930. (366,219.)

38,060. "Microphones." Ericsson Telephones, Ltd., and J. Morris. December 17th, 1930. (366,221.)

39,076. "Dynamo-electric machines." Electrolux, Ltd. December 28th, 1929. (366,228.)

1931

33. "Volume controls for radio receivers." J. H. Reyner and Burne-Jones & Co., Ltd. January 1st, 1931. (366,235.)

82. "Thermionic valves and similar electric discharge tubes." Telefunken Ges. für Drahtlose Telegraphie. January 6th, 1930. (366,238.)

840. "Glow-discharge lamps." Marconi's Wireless Telegraph Co., Ltd. January 13th, 1930. (366,247.)

841. "Radio and other high-frequency transmitters." Marconi's Wireless Telegraph Co., Ltd. January 31st, 1930. (366,248.)

1,165. "Electric motor control." British Thomson-Houston Co., Ltd. January 15th, 1930. (366,251.)

1,284. "Piezo-electric apparatus." Cleveland Trust Co. January 24th, 1930. (366,252.)

1,307. "Optical systems for photographic recording of the wave-form of electric currents such as those influenced by sound waves." A. P. Castellain. January 14th, 1931. (366,254.)

2,485. "Method and apparatus for wireless tuning circuits." L. E. T. Branch. January 26th, 1931. (366,273.)

3,835. "Production of dielectric materials." Steatit-Magnesia Akt.-Ges. February 10th, 1930. (366,282.)

6,925. "Thermionic valves." Telefunken Ges. für Drahtlose Telegraphie. March 7th, 1930. (366,315.)

7,000. "Signal transmitting systems, more particularly for musical or like programmes." General Electric Co., Ltd., and J. R. Collyer. March 6th, 1931. (366,317.)

11,492. "Radio and other high-frequency receivers." Marconi's Wireless Telegraph Co., Ltd. April 17th, 1930. (366,359.)

11,832. "Process for operating an electric discharge tube." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 1st, 1930. (366,366.)

15,888. "Plug and socket connectors for use in electrical circuits." A. P. Lundberg & Sons, Ltd., and G. Pegg. May 30th, 1931. (366,398.)

17,703. "Impulse transmitters used in telephone systems." Siemens & Halske Akt.-Ges. June 18th, 1930. (366,408.)

18,356. "Wireless signalling." M. Von Ardenne. June 26th, 1930. (366,410.)

18,573. "Production of rubber diaphragms as separators for primary and secondary cells, electrolytic cells, filters and the like." Dr. H. Beckmann. August 2nd, 1930. (Addition to 238,870.) (365,971.)

18,780. "Electric resistance elements." Akt.-Ges. Brown Boveri et Cie. July 30th, 1930. (366,411.)

19,080. "Page-printing apparatus for start-stop telegraph systems." Creed & Co., Ltd. July 11th, 1930. (365,975.)

19,409. "Telephone systems." Telefonaktiebolaget L. M. Ericsson. July 26th, 1930. (365,976.)

19,776. "Movable systems for electro-dynamic devices for transforming electric oscillations into acoustic vibrations or conversely." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 24th, 1930. (366,413.)

21,147. "Electric measuring apparatus." Landis & Gyr Soc. Anon. July 26th, 1930. (366,419.)

24,273. "Electric motor control systems." British Thomson-Houston Co., Ltd. August 28th, 1930. (366,428.)

24,780. "Electric control systems employing thermionic valves or the like." British Thomson-Houston Co., Ltd. September 4th, 1930. (366,431.)

25,852. "Conductors for use in overhead electrical transmission systems." J. D. Brunton, W. S. Davidson, and A. H. Seabrook. September 15th, 1931. (Cognate application 25,853/31.) (366,434.)

27,730. "Electric batteries." W. W. Triggs (National Carbon Co., Inc.). August 27th, 1930. (Divided application on 366,080.) (366,101.)

35,011. "Tools or devices for building up laminated cores for dynamo-electric machines." W. H. Scott, P. A. H. Mossay, and G. J. Scott. September 30th, 1930. (Divided application on 29,317/30.) (366,145.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 17th :—

Escolite (lettering and design). No. 527,379. Electrical accumulators for use with motor car starters.—Electric Service (Birmingham), Ltd., 125, Bristol Street, Birmingham.

Athco. No. 528,335. Class 8. Radio receiving sets and parts thereof.—A. T. Harrison & Co., 30, Kintore Street, Bermondsey, S.E.1.

Escort. No. 528,408. Class 8. Electric batteries (not for medical purposes).—Lewis Banks & Co., Ltd., 45-50, Holborn Viaduct, E.C.1.

Bedal. No. 528,149. Class 13. Electric irons and kettles.—British Domestic Electric Appliances, Ltd., 4, Broad Street Place, E.C.2.

Shannon Experiments and Results

Professor F. S. Rishworth was seconded from the chair of engineering at the National University, Galway, to act as consulting and supervising civil engineer for the Irish Free State during the construction of the Shannon development works. On February 19th, in Dublin, before the Association of University Electrical Enginers, he described some of the very interesting features of the works, which have not yet received publicity.

Professor Rishworth dealt first with the design of spill basins beneath the weir at the intake; the drainage of the spill-basin floor; and the grouting or cementation under pressure across the power canal head intake works and weir, and across the power house intake works to ensure the water-tightness of the rock foundations of those structures.

The greater part of the paper was occupied by clear descriptions of experiments on scale models.

The author pointed out that experimental work on models was not new, as may be seen from the works of James Thomson, Osborne, Reynolds, and J. A. Froude, and during recent years much experimental work had been done in the United States on weir discharges. Sir Wilfred Stokes used models to determine the most suitable form of intake for the Sennar Dam on the Blue Nile; and researches were carried out in connection with the Assouan Dam, tidal conditions in the Mersey, and the proposed new bridge over the Humber.

In connection with the Shannon works series of elaborate model experiments were carried out to determine the design of the overflow or waste channel in the intake at the power station; and to determine the discharge phenomena at different tail-water levels, this being especially important because the tail race is also a navigation channel.

Similar methods were employed in the examination of the conditions to be met when emptying and filling the double lift navigation locks which are built into the power house dam. Although these locks are only 106 ft. long by 20 ft. wide, they have a lift of over 100 ft. between tail-race and power canal, so that it was very necessary to destroy the energy of the discharging waters without disturbing the vessels in the locks or in the tail race. In every case the results were entirely satisfactory, and even exceeded expectations.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—School, Spring Hill, for the E.C.
Acton.—Flats (72), Western Avenue; J. Atherton & Co.
Ayr.—Showroom and saleroom for Messrs. Affleck (£1,800); the manager.
Aylesbury (BUCKS).—Houses (20) for T.C.; borough surveyor.
Barking.—Two schools (£23,700); J. Compton, director of education.
Barnsley.—Rehousing scheme for 446 families; borough surveyor.
Bexley (KENT).—Houses (82), Bexley Heath; New Ideal Homesteads, Ltd. Houses (92), Blendon Hall Estate; D. C. Bowyer. Maternity hospital; U.D.C. surveyor.
Bideford.—Isolation hospital, for the North Devon Hospital Committee; O. W. Ward, clerk.
Birmingham.—Licensed premises, Somerford Road and Shenley Road, Northfield; Mitchells & Butlers, Ltd., Cape Hill Brewery, Smethwick. R.C. school; parish priest, Our Lady of St. Patrick's.
Blackpool.—Extension of Hart Street works; Jones Textialities, Ltd.
Blean (KENT).—Houses (32), Sturry, for R.D.C.; F. A. Ward, surveyor, Herne Common, Herne Bay.
Bolney (SUSSEX).—Re-erection of jam factory; G. N. Arman.
Bo'ness.—Houses (18); borough surveyor.
Chester.—Rebuilding the "Brewers Arms," Upton; J. H. Davies & Son, architects, Newgate Chambers, Chester.
Clitheroe.—Housing scheme, Hayhurst Farm Estate; borough surveyor.
Crayford (KENT).—Two housing schemes; U.D.C. surveyor.
Croydon.—Congregational church, Sanderstead; trustees. Houses (55), Kingslyn Estate; J. C. Calcot, 36, Winterbourne Road.
Denbigh.—Re-erection of Tyffwrn (mansion), Trefnant, for Major V. R. Hamilton-Freeman.
Deptford.—Dog-racing track, Silwood Street; Culpin & Bowers.
Dorset.—Extensions, Weymouth Institution (electric lighting and power equipment); Jesty & Baker, contractors, Weymouth.
Dunblane (PERTHSHIRE).—Re-construction of Royal Hotel, Tyndrum; Robert Stewart.
Dundee.—Additions to Royal Infirmary; Johnston & Baxter, architects, 114, Seagate.
East Ham. — Tuberculosis pavilion, Harts Sanatorium (£10,000); borough engineer.
Eccles (LANCS).—Cinema; Councillor P. Ashcroft, chairman of directors of the Broadway Cinema.
Edinburgh.—X-ray apparatus for Craigleith Hospital; Corporation Public Health Committee.
Ellesmere Port.—Cinema, Carnegie Street; D. Minshull, Muspratt & Williams, 6, Abbey Street, Chester.
Falkirk.—Reconstruction of Pavilion picture house for Falkirk Picture House, Ltd. (£2,000); manager.
Fleetwood.—Bank, Ratcliffe Road and Warrenhurst Road; F. C. R. Palmer, architect, National Bank, Ltd., Bishopsgate.
Foleshill (COVENTRY).—Houses (92), for R.D.C.; H. B. Randle, builder, Bedworth.
Forehoe (NORFOLK).—Houses (35); R.D.C. surveyor.
Galston (AYRSHIRE).—Housing scheme; borough surveyor.
Glasgow.—Extensions to St. Roch's R.C. school (£42,000); master of works, Education Offices, Bath Street. Buildings (£18,000), Earl's Road, Grangemouth; Scottish Dyes, Ltd.
Gloucester.—Extensive alterations, Barton Gates; W. C. Matthews & Co.
Godalming.—Licensed premises, Northbourne Estate, Farncombe; Hodgson's Kingston Brewery Co.
Gravesend.—Drapery store extensions, New Road and Princes Street; T. A. & A. D. Delarue.
Guildford.—Sewage works; Dr. Faber, consulting engineer.
Hamilton.—Garage, workshop, showroom and offices, for M. C. Cullen; R. Orr, solicitor.
Hampshire.—Senior schools, Havant, for county E.C.; director of education, Winchester. Children's homes, various districts (£30,000); C.C. Assistance Committee.
Hastings.—Block of flats, Grosvenor Crescent; Henry Ward, architect, 8, Bank Buildings. Houses, Athelstan Road; Vine & Sons, builders, 15, Beach Road, Eastbourne. Houses, St. Helens Road; E. Taylor, builders, Hempstead Lane, Hailsham.
Hertfordshire.—School, Cat Hill, East Barnet (£21,922); Keeble, Ltd., builders.
Hinckley (LEICS).—Factory and shops, Regent Street; Atkin Bros.
Holywell (FLINTS).—Artificial silk factory, Greenfield; Courtaulds, Ltd.
Hoole (CHESHIRE).—Houses (50), for U.D.C.; Warrington & Sons, builders, Ellesmere Port.
Hove.—Re-instatement of business premises (electrically equipped) for Palmeira Stores.
Huntingdon.—Electrical installation in 16 houses, Anbury Hill Estate; Public Health and Housing Committee.
Ilford.—Schools, Mayesbrook (£44,000), Fairlop (£35,000), and Chadwell (£31,000), for Borough E.C.; W. S. Torbitt, director of education.
Inverness.—Extensions, Inverness District Asylum (£85,000); superintendent.
Irish Free State.—(BALLINA, Co. MAYO).—Church, Pulathomas; W. H. BYRNE & Son, architects, 20, Suffolk Street. Dublin. (CORK).—City hall and municipal offices (£150,000); J. Sisk & Son, builders, Cork. (SWORDS, Co. DUBLIN).—Houses (50); F. Gibney, architect, 16, Westmorland Street, Dublin.
Jarrow.—Houses (100); borough engineer.
Kent.—Schools, Halfway Street, Sidcup, and Poverest Road, Orpington; County E.C.
Lanark.—Houses (48), for T.C.; Mr. Stewart, architect.
Lanarkshire.—Houses, Cambuslang (100), and Cleland (40), for the C.C.; housing architect, Renfield Street, Glasgow.
Langholm (DUMFRIESSHIRE).—Two housing schemes; burgh surveyor.
Leicester.—Schools for St. Peter's parish; Rt. Rev. Mgr. R. Barry-Doyle.
Leicestershire.—School, Bridge Road, Coalville; county E.C.
Lichfield.—Hospital; J. Deacon, builder, Lichfield.
Liverpool.—Housing scheme, Huyton Farm Estate; Land steward and surveyor, Municipal Buildings.
Loddon and Clavering (NORFOLK).—Houses (20); R.D.C. surveyor.
London.—(CHELSEA).—Cinema, King's Road; Gaumont British Picture Cpn., Ltd. (LEWISHAM).—Houses (144), Perry Hill; L. A. Culliford. (MARYLEBONE).—Reconstruction of Richmond Arms, Carlisle Street area; Watney, Combe & Reid, Ltd. (SOUTHWARK).—Houses, Sumner Street (£36,000); City of London engineer. (WALTHAMSTOW).—Houses (750), Salisbury Hall Estate; borough surveyor. (WESTMINSTER).—Flats (141), Grosvenor Estate (£79,900); Gee, Walker & Slater, Ltd.
Lowestoft.—Pumping plant, with electrical work, Oulton Broad pumping station; borough surveyor.
Lye (WORCS).—Houses (200); U.D.C. surveyor.
Malmesbury (WILTS).—School, Holloway, for R.C. managers; Rev. A. Grorod.
Manchester.—Offices and flats, Fogg Lane, Didsbury; Winstanley, architect, 3, West Crescent, St. Anne's-on-the-Sea. School and synagogue, King's Road, Sedgeley Park; Jewish minister to the Sedgeley Park Congregation.
Middlesex.—School, East Acton; county E.C.
Midlothian.—Elementary school, East Calder; A. L. Fletcher, director of education, Midlothian Education Committee, Edinburgh.
Morecambe.—Reconstruction of hotel for L.M.S. Railway; Oliver Hill, architect, Survey Department, Euston Station, N.W.1.
Newcastle-on-Tyne.—Extensions, Gaumont Film Stores, St. John Street; P. L. Browne & Son, architects, Pearl Buildings, Newcastle. Shops, Green Market; F. H. Holford, city architect. Bungalows (98), St. Anthony's Estate; city engineer.
New Malden (SURREY).—Church (£8,200) for the Wesleyan Trustees; Rev. A. T. Johns.
Nottingham.—Public house, Broxtowe Lane, Bilborough; Barnes, Booth & Richardson, surveyors, Albion Chambers, King Street.
Oldham.—Housing scheme (330), Belgrave Road; borough surveyor.
Paignton.—Houses (35), Dartmouth Road; Major Watcott.
Paisley.—Good Templar Hall (£15,000); H. Cook & Hamilton, architects, 7, Gilmour Street.
Poole (DORSET).—Isolation hospital (£49,000) for R.D.C.
Preesall.—Housing scheme; U.D.C. surveyor.
Preston.—Houses (41), Frenchwood Estate; borough surveyor.
Princes Risborough (BUCKS).—Cinema; Horace Wright. Princes Cinema.
Quarrybank (STAFFS).—Additional housing scheme for U.D.C.; T. B. Claydon, surveyor.
Radcliffe.—Conversion of Beech House to British Legion Club premises; A. Brocklehurst, architect, 6, Fleet Street, Bury.
Rawtenstall.—Hotel, Burnley Road, Crawshawbooth; J. Baxter, Ltd. Factory; Foden, Hemm & Williams, architects, Manchester and Liverpool.
St. Albans.—Business premises, St. Peter's Street; P. C. Blow, architect.
St. Leonards-on-Sea.—Improvements to New Cinema, London Road; John Bernard Mendham, architect, 1, Carteret Street, S.W.1. Block of flats, Pevensey Road; H. M. Jeffery, architect, 1b, Havelock Road, Hastings.
Salford.—Houses, Wheater's Field (96), and Gerald Road, Pendleton (84); city engineer.
Shardlow (DERBYSHIRE).—Houses (96) for R.D.C.; H. T. Sudbury, architect, Rutland Chambers, Lord Haddon Road, Ilkeston.
Sherborne (DORSET).—Church, North Road (£20,000); Rev. K. M. Preston.
Shipston-on-Stour.—Houses (30); R.D.C. surveyor.
Slough.—Rebuilding Crown Hotel; proprietor.
Stirling.—Houses (528); borough surveyor.
Stockport.—Extensions to factory, Bredbury, for Joseph E. Ward, Ltd.; Crompton Bros., builders, 44, Stockport Road, Hyde.
Stockton-on-Tees.—Schools, Newham Grange, west end and east end, and extensions at Norton and Central Schools; J. P. Wakeford, borough engineer.
Surbiton (SURREY).—Re-erection of club house (£6,000) for the golf club; secretary.
Tonbridge.—Houses (28); R.D.C. surveyor.
Tynemouth.—Houses (301), near Howmen Road; borough engineer. Houses (22), Roxby Gardens; W. Moore. Houses (22), Salisbury Avenue, Preston; Dixon & Bell.
Wallasey.—Hospital; special committee of Corporation.
Warrington.—Public house off Manchester Road, for Greenall, Whitley & Co., Ltd.; Wright & Hamlyn, architects, Patten Chambers, 20, Winmarleigh Street.
Weston-super-Mare.—Houses (270) for U.D.C.; H. A. Brown, surveyor.
Weymouth.—Houses (67), Faircross Estate; Smith & Lander. Bazaar premises for Marks & Spencer, Ltd.; A. E. Batzer, architect.
Witney (OXON).—Houses (100); U.D.C. surveyor.
Wickham (SURREY).—Houses, Ridgement Avenue (40), and Wickham Road (5); P. Richardson, 7, Royal Parade.
Worcester.—Licensed premises, Bromwich Road (£7,000); Showells, Ltd. Rebuilding business stores, High Street and Pump Street; Russell & Darrell.